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VOL. XVIII. No. 9

LOS ANGELES, CAL.,

February I, 1898,

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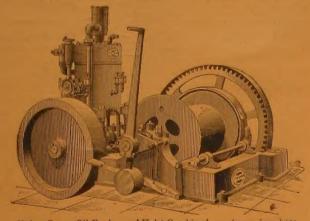
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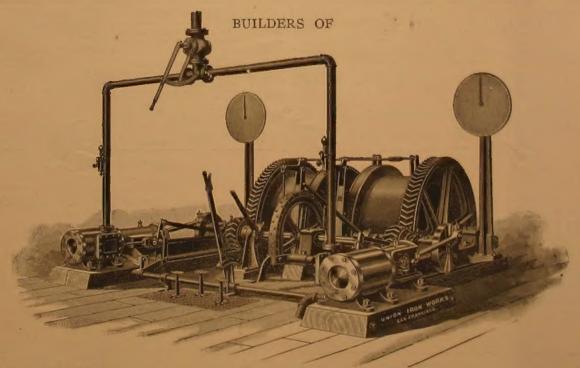
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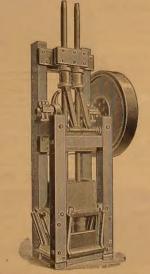
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# The Mining Jurgical And Metal Journal

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No. 9

F. W. EDELSTEN, Editor.

JOHN STEWART, Special Contributor.

ULRICH KNOCH, Publisher

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#### LIBERAL MINING LAWS.

To any country possessing undeveloped mineral territory, the first necessity for ob-taining the full benefit therefrom is the enactment of the most liberal laws in aid of prospecting and deep mining. It is not simply sufficient to encourage prospecting and the discovery of new mineral areas, but the capital invested must be protected to ensure ownership of the minerals discovered in depth, and to give permanency to the enterprise, by making the operation of the vein or deposit by continuous work in the minerals, instead of applying surface laws and customs, to the altered and different conditions found in prosecuting deep mining.
In the Western United States, these two

wise provisions have been made the basis and foundation of our liberal laws regulating mining. They are the product and result of both European and South American experience, and have been the chief cause of attracting labor in the first instance, and afterwards capital, to a field far from civilization, and fenced off from intercourse with the commercial world, by natural obstructions, unfavorable climatic conditions, hostile natives, and

far off from a source of supplies.

The discovery of gold in this state, and the active operation of placer mining, about fifty years ago, was the birth of the industry, followed a few years later by the discovery of the gold-silver ores on the Comstock lode in Nevada. The necessities, usages and customs of these times gave to the neighboring States and Territories the most liberal mining laws that could be devised to encourage prospecting and mining. To preserve these two necessary provisions in the future, ought to be the aim of all interested in mining, as surface conditions and laws are not at all suited

to underground mining problems. If we examine the condition of those countries where surface conditions for the boundaries of claims are made to control underground work, we find the industry is neglected by both labor and capital. Any country where minerals are found requires good laws to encourage mining, or the minerals become of no value to the people, through not being worked.

#### PLACER VERSUS LEDGE MINING.

Placer mining is pre-eminently the poor man's occupation on account of the small plant and knowledge required. It also has a great attraction for capitalists of inexperience in mining, on account of the speed with which returns are possible when an extensive plant has been erected. For these reasons, a new placer camp, with rich spots in a few places through the district is almost certain to cause a panic or a boom among the inexperienced to go there and strike it rich. The present Klondike craze is a case in point-of some thousands of inexperienced persons rushing to a district, with the worst climate in the world for placer or ledge mining, where there are nine months of winter and three months bad weather to contend with, and a thousand or more miles from supplies and civilization. The success of a few, who chanced by good luck more than by good judgment to locate on rich spots, and the greatly exaggerated, sensational, newspaper and transportation company reports, have inflamed the ignorant mind to fever heat. It is only those who have experienced the hard-ships and sufferings of life in the far north, and the extreme difficulty and expense of conducting any kind of mining in such an inhospitable country, that can realize and understand the situation, with its risks to life and injured health in after years, if the Alaskan prospector is so fortunate as to return. Only such persons as are good wood choppers, experienced boat and canoe men, with an indiarubber constitution to withstand the cold of winter and the wet of the rainy season, who possess a cast-iron back for carrying cordwood, should think of attempting prospecting in the Northwest and Alaska.

In the occupation of prospecting for ledge claims, some experience is required, as the true saying is, "the successful prospector is born with an instinct for the business, and is not made on short notice." Hence it is that the experienced miner makes the best prospector, as a certain amount of knowledge of minerals and their mode of occurrence is necessary to conduct the business of locating mineral claims which will have future value or are worth developing. The ideal of excellence in the mind of too many prospectors is, the much sought-after, and not always found, "poor man's claim." By that is meant a lode or vein which has rich spots or ore shoots, which hold pay ore on the surface, so as to enable him to make the claim pay for living and development expenses from the first commencement. Such propositions are generally small rich veins, holding rich ores or coarse free gold in places, and are not the class of deposit requiring large capital to operate. To many prospectors, the real bonanzas of modern times have no attraction, as this class includes large, low grade propositions, capable of producing one or more hundred tons of ore per day of poor grade; but, as it is quantity of ore that makes the mine, the wise expenditure of capital in erecting the proper class of machinery, soon makes the large low-grade deposit pay more per day,

and every working day in the year, than is capable in mining on the small vein, with rich ore in spots and occasional rich ore shoots.

The advantages of climate, proximity to markets and civilization, liberal mining laws, rich mineral territory, easy access to capital, all tend to make prospecting in the Western United States more desirable than the risk and dangers to life and health, and oppressive mining laws and alien act, offer to Americans who anticipate trying their fortune at mining frozen gold in the Arctic placers of the Canadian Northwest Territories.

#### A DISCOURAGING OUTLOOK.

The speech of Mr. Wolcott, of Colorado. in the Senate the other day, in which he re-ported the efforts and results of the International Bimetallic Commission, was discouraging to those who have hoped for some satisfactory agreement with European nations on the subject of silver. The senator has been among the most hopeful that a favorable result would be achieved; but his hopes have been so far blasted that he has resigned from the commission. Whether a successor will be appointed and efforts continued, the future will disclose.

The situation is such that it seems inevitable that the money question will now be more sharply in issue than ever before. Many Republicans voted for McKinley in the belief that he and his party would do something of value for the cause of bitmetallism; but as the only thing proposed has turned out a failure, and as the administration, through the secretary of the treasury, has pronounced in favor of the gold standard unequivocally, the question is what will the bimetallist Republicans do? Ex-Senator Du Bois, of Idaho, says they will join the silver Republican party, which is not improbable. The present indications that the money question in features essentially the same as they were in 1896 will be fought over until one side or the other is placed completely hors de combat. Both sides are passing it, unmixed with any ambiguity, clap-trap or subterfuge. On the money question, lines of political parties seem destined to be drawn, and that the whole people will array themselves on one side or the other—no middle ground is reserved for standing room.

#### MR. GAGE'S PREDICTION.

The Secretary of the Treasury said the other day that the United States would soon become a creditor nation. The hope is uni-versal that the prophecy will be verified; but he did not go into details, showing how such a condition is to be reached at an early day.

We are sending abroad annually to pay in-terest a sum which indicates that foreigners hold the securities of our national, state and municipal governments, and of railroad and other corporations to the extent of three or four billion dollars, which are to be paid in gold. Besides, it is stated that we are paying foreigners for transportation on the high seas \$100,000 000 annually, and it is estimated that our people expend in travel abroad a like sum. To meet these conabroad a like sum. To meet these con-stantly accruing obligations and expendi-tures will surely exhaust all balances of trade in our favor and the productions of our gold mines. We may get out of debt after a time, but that will not assure loaning to foreign governments nor investment to any great extent in foreign enterprises.

The governments which are able to pay without trouble and promptly are few, and they are able to borrow of their own people. Refore there is talk of our becoming a credi-Before there is talk of our becoming a creditor nation, we had better be sure that we are in the way of getting out of debt ourselves. When that happy day shall arrive, it will be the proper time to talk of foreign loans and investments. This great country will afford the means of profitably employing all the capital our people have for several generations to come. Let our people get out of debt as fast as they can.

The average amount of ore crushed per stamp for each twenty-four hours in California is about two tons. Should the average stamps in operation reach 7500 per day and night crushing, the result would be 15,500 tons a day or 5,657,500 tons per year. Should this average be cut in two it would still represent a respectable amount of ore consumed and bullion produced.

the plant. It covers a ground space of 24 acres over all, with a total frontage of 1,400 feet, while the actual floor space utilized by the works proper is 18 acres. With this great industry the annual output is enormous, sometimes exceeding \$3,000,000, while the wages of the employes range about \$100,000 a month. The real extent and magnitude of these works can be understood, and the demands upon its productive possibilities measured when it is computed that the company utilizes an aggregate of 8,000 cars per annum, with a monthly output of 3,300,000 pounds of structure. These figures show to what a stage American skill, energy and perseverance can push a venture which, when started, gave no promise of its ultimate magnitude.

Less than forty years have witnessed the growth and development of the Allis works. In mining machinery manufacture the company has made a most creditable advance. The first mill was of such construction that its trial was held with much anxiety, but the

#### GOLD MILLING IN THE BLACK HILLS #

BY PROP. II. O. HOPMAN.

of the Dakota School of Mines, Rapid City, Dakota.

The following is a paper read before the American Institute of Mining Engineers:
With the exception of the exhaustive paper on the Father de Smet mill by its designer, Mr. A. S. Bowie, Jr. (Trans. x., 87), nothing, so far as the writer is aware, has as yet appeared on the stamp-mills of the Black Hills of Dakota, although they have been steady producers for the last ten years. Within the small area of about 6,000 by 1,600 feet, \$2,271,341.14 was produced in 1887† from rock averaging \$4 per ton in free gold.

#### I. THE ORES.

Character of the Ores.—The gold of the district is found in quartz and pyrites finely distributed through vast bodies of mica and amphibole-schists, argillites and phyllites, and also impregnating the schists themselves. The "Belt," embracing the section of Lead



WORKS OF THE EDWARD P. ALLIS COMPANY AT MILWAUKEE, WISCONSIN

#### WORKS OF THE E. P. ALLIS COMPANY AT MILWAUKEE.

There is no plant in the United States that so deserves the foremost rank it has attained as that of the E. P. Allis Co. at Milwaukee, Wisconsin. They are pioneer manufacturers in their line, and receive the recognition which they have earned from mines, mills, smelters and kindred concerns the world over. When the construction of a mill is decided upon, almost the first bid desired is that of the Allis people. To their invention and industry is due the manufacture and introduction of triple and quadruple stationary entires of the expansion type. gines of the expansion type. From the be-ginning the field of utility of the Allis out-put has steadily expanded, and today the world vouches for the superiority of its manufactures.

The excellent illustration of the Reliance Works of the Allis Company, presented herewith, gives but an idea of the vast extent of result of the first day's labors exceeded the guarantee and assured the success that the mill deserved in its new field. Since that day improvements in the essentials of the mechan-ism have increased the capacity.

No mill leaves the works without the highest test, and few, if any, are built which do not reflect credit upon the manufacturers, Thus from the manufacture of the first mill, the company's energy and reliability has se-cured a popularity which threatens to result in the enlargement of their plant to satisfy the orders that are daily received from all American machinery parts of the world. leads the world.

The perforating works of A. J. Beckley & Co., of Garwood, N. J., are busy on mining screens for the Western mines, including 100 screens for the Klondike placer mining district, which are soon to leave for the Pacific coast.

City, Terraville and Central City, is the only part worked at present.

The principal associated mineral is iron pyrite, with some arsenopyrite and chalcopyrite, garnet and asbestos.

The ores from open cuts and upper levels are more free-milling than those from underground workings below waterline. Hence the mills running on oxidized ore have tailings as low as \$0.25 per ton, while tailings from unaltered ore run sometimes up to \$2.50 per down the plates it can be readily determined whether the ore comes from higher or lower levels. In the former case it will generally have a brownish red color, in the latter a bluish gray. The amount of free gold in the ores varies, therefore, with the depth at which they are mined. It is difficult

The substance of this paper, with same additional matter, is published, by permission of the Concil, as a part of the As-nual Report of the Dalous Echool of Mines, with which Prof. Holman is connected.
† See Report of the Director of the Mine.

to give a correct average figure of its value,

but \$4 per ton will be near it.

The total value of the ore is not definitely known, as its weight is not actually determined, but only estimated, and regular dry assays are not made at all.

To determine the amount of free gold in the ore, the following method is in practice: Samples are taken daily from the different workings in the mine and sent to the 'sampler," who crushes them, paus them and esti-Every valuation mates the gold in the pan. thus made is booked, and at the end of the month the average is taken and compared with the output of the mill, and the amount of gold recovered thus approximately determined. The mode of operation practiced by the "sampler" is simple: The sample, weighing, say ten pounds, is emptied into a fourgallon bell-shaped mortar (131/2 by 121/2 inches) and crushed to nut size with a heavy pestle, swung from a spring pole. From it two pounds are then transferred into a second mortar of the same size, with a wooden lid, and there pulverized wet to a fine pulp, by means of a small steam stamp, which is in reality an old power drill fitted up for this purpose. When sufficiently fine (as judged by the ring of the pounding stamp), the pulp is panned until all pyrites and other heavy sands are washed off with the tailings, and only the free gold remains. The "sampler" of the Homestake company pans from fifty to fifty-five samples per day. Great skill is acquired in thus estimating the value of the ore, the sampler being able to make from eight to ten valuations an bour.

As these are the only determinations made, it can be readily seen that the amount of the non-free-milling gold which enters the mill is not known. The percentage of sulphurets has been determined in several instances, and varies from 2½ and 3 per cent to 6 and even 10 per cent. The assay-value of pure concentrates, freed from rusty gold or gold that is still enclosed in quartz (the ore being not sufficiently crushed), has lately been shown to vary from \$4 to \$90 per ton, the average for the district being about \$25 per ton.

Sorting of the Ore.—As the gold is finely disseminated throughout the entire vein-matter, comparatively little sorting in the mine can be expected. There occur, however, in many parts of the veins, igneous intrusions, locally called porphyry, which form 'barren horses." When the Nevada system of timbering in square sets was exclusively in use, no distinction was made between mill-rock and waste, but it was considered that the cheapest way to get rid of the latter was to run it through the mill. Lately, however, it has become the custom to fill the chambers formed by this timbering with waste rock and to hoist any excess of it to the dump, thus sending less waste through the mill; but large quantities are still got rid of in the old way, by running through the mill.

II. ENUMERATION OF MILLS.

When in 1876 the auriferous gravels and lodes were discovered, there was a "rush" to the Black Hills, and in a very short time a large number of mills sprang up. Of these, the seven named in the accompanying table are still running, with 640 stamps:

The 25-stamp custom mill, the "Cassel" mill, which was built at Central City, about the same time as these, is running principally on cement gravel and will not be discussed

Although the mills given in the foregoing table are owned by five separate companies, they are all, except the last, under the management of the Homestake superintendent. Thus it follows that the working details of the six mills are all, as far as practicable, after one model-the Homestake. The Caledonia mill stands alone, and works on a very differ-Therefore the details of its plant ent rock. differ considerably from those of the others.

In the following columns the general arrangement of each mill will be given separately; but the details will be summarized under two heads, Homestake and Caledonia.

#### OUTLINE OF PLANT AND PROCESS.

The crushing is done by means of rock breakers and stamps. The breakers reduce the coarse ore to a size suitable for the stamps. The ore, arriving at the highest level of the mill (the ore-floor) in mine cars, is discharged from the side or the bottom of the car (dumping and bottom-discharge cars being both in use) over grizzlies to the crusher-floor; or it goes directly to the crusher-hopper. small ore particles, passing through the grates of the sizing screen, and the coarse ore (which has been reduced in size by the crushers), both drop into the same ore-bin, which reaches down to the cam floor. Here a number of chutes deliver it to the automatic feeders, each of which discharges its contents continuously into the mortar to which it belongs. Here the ore is pulverized by stamps (five in each mortar) lifted at regular intervals by corresponding cams, which are keyed to a camshaft, placed in front of the battery on the cam-floor. Water is fed continuously into the mortars, and forms, with the ore, a liquid pulp, which passes through a screen at the front on to and over the apron plates on the lower floor of the building. The Caledonia mill has blankets on the lower end of these plates to catch any coarse, heavy particles; in the other mills the pulp passes directly from the apron-plates to the mercury-traps, and through them on to sluice plates. From the traps, placed at the end of these, the pulp runs into one main sluice which may again have one or more traps before the pulp is finally allowed to run to waste.

Thus the entire process of passing the au-riferous coarse rock from the ore-floor to the final discharge, at the end of the main sluice, is an automatic one.

TABLE I .- List of Stamp Mills.

NAME OF MILL	YEAR OF ERECTION		NAME OF COMPARY	NO. OF STAMPS.
Homestake		Lead City	Homestake Mining Company	80
Golden Star		Lend City	Homestake Mining Company	120
Highland,		Lead City	Highland Mining Company	120
Dead wood		Terraville	Deadwood-Terra Min. Co.	80
Golden Terra		Terraville	Deadwood-Terra Min. Co.	80
Father de Smet		Central City	Father de Smet Min. Co.	160
Caledonia	1879	Terraville	Caledonia Min. Co.	60"

<sup>\*</sup> To the Caledonia mill twenty additional stamps are being added. These will be running by the time this paper appears in print, making an aggregate, outside of the Cassel mill, of 660 stamps.

Battery amalgamation is used to extract the gold. It begins in the mortar, where mercury is added at intervals (while the continuous fine crushing with the stamps is taking place) and ends on the apron-plates, where nearly all the amalgam not retained by the inside amalgamated copper plates is collected daily, any deficiency in the collecting mer-cury and amalgam on the plates being supple-

mented by the various traps.

As the mills on the "Belt" have to treat low-grade ores, it is necessary to their profit-able operation that large amounts should be put through as rapidly as may be, and that, at the same time, as much gold as possible should be saved by simple means. To effect this, a compromise is made between the two extreme methods of gold-milling. One of these aims at extracting as much gold as pos-sible in the battery at the expense of capacity; the other by amalgamating outside of the battery, increases the crushing capacity, but requires a number of expensive operations to recover the gold. In the Black Hills amalgamation is carried on both inside and outside the battery, thus combining the simple way of recovering the gold from the first method with the large capacity of the second The aim is to crush rapidly to the desired fineness, and arrange the amalgamation so that it shall be adapted to the large amount of pulp pro-

#### IV. GENERAL FEATURES OF THE MILLS.

Table II. gives a comparative view of the dimensions, power, batteries, and product of the mills. The following is an explanation of the letters employed in this table:

A. Horizontal 155 H. P. engine, with Meyers cut-off. B, 200 H. P. Harris Corliss engine. C, 330 H. P. Corliss engine, Frazer & Chalmers pattern. D, two 60 H. P. horizontal engines with automatic cut-off; one driving forty stamps, the other driving forty more.

a. Length and width are always of mill proper, excluding engine-room.

b. The boilers in this table are all horizontal tubular, 54 in. diameter, 16 ft. long, with 46 tubes of 31/2 in. diameter. Steam pressure is kept at 90 lbs. per square inch.

c. Made up as follows: Wrought-iron stem (length 14 ft., diameter 31/8 in.), 340 lbs.; cast-iron head (height 18 in., diameter at top 9 in., at bottom 8 in.), 240 lbs.; cast-iron shoe, (cylindrical, but 8 in. high and 8½ in. diameter, tapering shaft 4½ in. diameter at base, 3½ in. at top, 5 in. high—the shoe because, 3½ in. ing made of white iron, chilled for 61/2 in. from base, the next, 11/2 in., and the shank being cast in sand and cooled slowly), 140 lbs.; cast-iron gib-tappet (diameter at ends 91/4 in., in middle cylindrical part 6 in., wearing faces 2½ in. thick, middle part 7 inches long, total length 12 in.), 130 lbs. Total, 850 lbs., stem, head, shoe and tappet being proportioned as 34:24:14:13.

d. Batteries in two rows, back to back, leaving this space between the rows for orebins and feeders.

e. From June 1, 1887, to May 30, 1888, in-

f. Estimated from report of Homestake Co., June, 1888, where product of 200 stamps in Homestake and Golden Star mills (under same management and similar conditions) is given as 243,355 tons for the year ending May 30, or 1,216,775 per stamp.
g. See report of the Director of the Mint

h. Will be increased to 20 in., as 18 in., which was enough for 60 stamps, is not enough for 80.

Formerly 12, the mill having been originally built for 60 stamps.

Batteries in single line

Batteries in two rows, but face to face, with this space between them.

m. Intentionally slower crushing on harder

921

For year ending April 30, 1888. Excluding some concentrates from preceding year.

Distribution of Power.-The methods employed in transmitting power from the engine to the different parts of the mill may be classed under three types, represented respectively by the Homestake, Golden Star, and the Deadwood, Golden Terra, and Father de Smet with the Highland, notwithstanding local variations, especially such as are necessitated in the Father de Smet by the peculiar arrangement of its batteries.

1. In the Homestake mill, the continuation of the engine-shaft forms the one-line shaft of the mill and is placed on the battery sills. This is a cheap construction and gives a solid foundation for the boxes, in which the line-shaft rests. The shaft is kept in line by the even pull of the long belts placed on each side at an angle of about 30 degrees. The supposed disadvantage of being obliged to stop the entire mill, if anything happens to the line shaft, is insignificant. When the the line shaft, is insignificant.

to draw it off the line, and also causes great wear and tear. As to placing the line shafts in front of the batteries on the cam-floor or behind the battery-floor, there is a diversity of The former arrangement, as at the opinion. The former arrangement, as at the Golden Star mill, gives the best light in the mill and makes the shafts easily accessible. The power from the engine shaft is transmitthe power from the engine shart is transmitted to the line-shafts, and from these to the cam-shafts, by long belts, which are nearly horizontal. They require no tighteners, and last longer than those of either the Homestake or Highland mills. On the other hand, the boxes of the line-shafts rest on transverse sills on the cam-floor, which, although braced and strengthened in various ways, cannot furnish the same sure foundation as that at the Homestake and Highland mills. Experience has shown, however, that this disadvantage is more than counterbalanced by the smaller consumption of belts and the easy accessibility of the line-shafts. The Highland mill has the line-shafts on the sure foundation of the battery-sills; but the darkness and the exposure of the line shafts, thus placed just be-hind the mortars, to the trickling of water and fine ore, are serious disadvantages. Again, the belts from the main shaft down to the line-shafts, and from these up to the camshafts, are short and steeply-inclined, requiring powerful tighteners, which causes an in-

Name of Mine or Company.	Average of	Asse of Tallings.	No of Stamps.
omestake Company aska Mining Company. Callan	4. T.T	\$32 - \$78 572 5703	100 200 70
iba	as 8,70	1.04	15

In California, on a considerable variety of gold ores, the percentage of gold saved averages 80 to 85 per cent., and most careful daily tests in some of the best mills using concent-

rators show 85 to 90 per cent.

As to the loss that does occur in gold amalgamation, it is very easy to determine both the quality and form of loss, equally necessary to be known before proceeding to im-provements. Small samples are taken from the waste outflow of the mill-or separately of the different batteries—at regular intervals, until a bucket is collected, which is allowed to settle for several hours, the clear water poured off the top and the residue evaporated to dryness; then well mixed, sampled, and assayed. Even in the dipping out of each small sample, an error may be made if the vessel be allowed to overflow, so producing a concentration of heavy sand and mineral. Samples properly taken in this way daily, and averaged up, will establish the assay value per ton of tailings; and the samples have then to be examined to determine what state the the gold is in. An automatic sampler for mill tailings is of great utility, and more re-

TT \_ Dimensions Power Ratteries and Product

	Dir	nensions.	4.	Bolle	T0. b.		Rng	ines		5	Stamp Be	itteri	29		1	Product.	
MILL	Length. Feet.	width.	Vertical dist. of Crusher — floor above bottom of ore big. Feet.	Number	Cords of wood per 14 hours.	Type	Dia.	nder Stroke ches.	Number.	Distance be- tween lines, Pt.	Weight of stamps. Lbs. c.	Drop. Inches.	No. of drops per minute.	Tons crushed per stamp in 24 hours.	Tone milled in	Bulllos pro-	Average yield per ton
Homestake	100	80	141/5	2	11	A	20	42	16	441/d	860	9	86	4.5	96,7900	2000 102	40.71
Golden Star	120	88%	28%	4	14	В	20	60	24	36 <i>d</i>	850	9	85	4.5	146,565e	\$903,407	\$3.71
Highland	112	92	22%	4	14	C	26	60	24	464	850	9	85	4.5	146,013/	410,953g	2.82
Deadwood	112	46	22%	2	11	A	20	42	16 <i>i</i>	k	850	9	85	4.5)			
Golden Terra	112	46	22%	2	11	A	18h	4.2	167	k	850	9	85	4.5	216,2617	639,229g	2.02
Father de Smet	68	60	40	2	11	A	20	42	20	36/	850	9	85	4.5			
Caledonia	84	4634		2.		D	20	30	12	k	850	12	74	3.3	73,422m	296,816a	4.020

mill was built in 1878, the line-shaft was not made of sufficient thickness, in consequence of which it became twisted and broke within two years. The new shaft, having the requisite strength, has been steadily in use ever since. For minor repairs, the position of the shaft is a disadvantage. It is in an obscure place where it escapes attention, particularly as everything has to be done by artificial light.

2. In the Golden Star mill, the power is transferred from a small main shaft to two line-shafts on the cam-floor, the main shaft being nearly on the same level. This arrangement is favored by builders on the Pacific coast. It is shown in the Providence mill, Nevada City, Cal., for description and drawing of which see the paper of Mr. F. D. Browning on "Gold Chlorination in California," in the School of Mines Quarterly for 1884.

In the Highland mill, the small main shaft is placed between cam-floor and batteryfloor, and is connected with two line shafts, placed on the battery sills, behind the mor-

Both of these mills have two line-shafts. which is probably necessary considering the power that is required for a 120-stamp mill. The disadvantage is that the pull of the belt, on one side only of the shaft, has a tendency creased consumption of belts. The mill, however, like the Homestake, is so arranged as to leave the battery, with the apron and sluice-plates, free from any superstructure.

The relation of the horse-power of the engine to each stamp averages for the seven mills about 1.7:1. This low figure is due to mills about 1.7:1. This low figure is due to the large number of stamps in each mill (80 to 120), which is much higher than the common average in gold-mills.

(TO BE CONTINUED.)

#### LOSSES IN GOLD AMALGAMATION.

Before attempting to lessen a stated loss in gold amalgamation it is necessary to establish exactly (1) the amount, and (2) the form in which it occurs. Although copper-plate amalgamation in not a perfect system, it is much better in results than many inventors of new processes believe. For example, a simple reference to the California State Mineralogist's report will show that tailings assays in mod-ern mills average now from 1/2 to 1/2 dwt. per

The following table gives results at a few typical gold mills, and will be interesting as an offset to the frequent outcries about universal large losses in gold milling:-

liable than the irregular sampling by some employee, as is usual. The loss will be in one or more of the following forms:—

(1) Loss of free gold, quicksilver, or amalgam, all due to careless or inexperienced amalgamation.

(2) Free gold and gold-bearing sulphurets, attached to or imbedded in particles of rock. (2) Gold contained in base metal sulphides.

broadly termed "sulphurets."

(4) Gold in the fine slimes.

(5) A condition of gold in which it is not susceptible of copper-plate amalgamation.

The first test is to determine under which of the above heads the serious loss occurs, for some loss may be found in each class; and a process which may be effective on fine gold, for instance, may be utterly useless on sulphurets, and vice versa

A fair average of the daily tailings samples is examined as follows:-

(A) It is panned down very carefully, to determine if free gold, or amalgam, or quicksilver is to be seen. If any of these be found, no further tests on tailings samples are necessary until the man in charge of the almagation is replaced, or instructed in his business. In making this simple test it must be borne in mind that evaporating the tailings at a high heat may drive off any fine quicksilver. It is to be noted that the use of quicksilver wells before the copper plates is a cover for careless or inexperienced work, with plates immediately below the screens a perfect index is afforded of work inside the battery and of the proper proportioning of quicksilver feed or the conrary; while the quicksilver well hides the fact of an excessive feed of quicksilver or the reverse, for some time. The gold that is caught in a quicksilver well will never get past the plates, if these be in good condition.

(B) A quantity of the average sample is sized on screens, say 60-mesh and 100-mesh brass wire cloth, and each of the three sizes so obtained weighed to determine their relative proportions, and assayed separately. If the portion remaining on 60 mesh assays quite appreciably above the finer sizes, the losses by imbedded gold can be dimished only by finer crushing, either in the battery or outside by a consequent grinding. The coarse portion on the 60-mesh should be ground finer in a mortar, and panned, to see if the loss is in free gold or sulphurets, as this would have a bearing on what batteries and coppers alone would do by finer crushing. Should the assays show approximately equal value in the coarse as in the finest particles, it is clear that to use a finer screen in the battery would simply diminish capacity, without materially increasing the percentage saved. If the slimes below 100-mesh assay higher than the other sizes a coarser screen in the battery will probably give better commercial results, by increased capacity without increase of loss.

(C) A weighed portion of the average tailings sample is next vanued or panned down, to determine if any sulphurets exist, and if so the percentage of the same. The sulphurets washed out are assayed, to establish their value with reference to commercial treatment after concentration. The weight and assay value of sulphurets, calculated on the weight of sample washed, will give the value per ton of original tailings saved in the form of sulphurets. In this test, of course, it is assumed that test (A) has been previously applied, because imperfect amalgamation would vitiate the sulphuret concentration test by introducing amalgam into the concentrates. concentration test requires more skill to make than the preceeding, because the fine sulphurets are by no means easy to save close by a hand test. If an ordinary gold-pan be used to wash with, the process must be re-peated at least three or four times, washing from one pan to another and back again, and collecting each time the sulphurets; for the gold-pan is a very imperfect appliance for saving fine mineral, and a Frue vanuer in prac-tice will give both cleaner concentrates and poorer tailings than a hand test will show. The Cornish vanning shovel is a far better tool than a gold-pan for sulphurets, but not so good for free gold or amalgam. The angles of the sides of a gold-pan collect the free gold, but cause a disturbing ripple in the water when washing sulphurets, which floats them off. The vanning placque is a circular flat curved dish of sheet iron enameled white all over, to prevent rust and to show up better the color of the sulphurets. In shape it is practically a vanning shovel without a handle, but, like the latter, it requires a special skill in its use, obtained only by practice. Its advantages are, white surface, freedom from rust, and convenience of carriage, as it will go in an ordinary valise. The Mexican batea is also a very good tool for hand tests for both free gold and sulphurets, and requires much less skill for collecting the mineral than a shovel or a placque. This tool can now be obtained of enameled from which, while perhaps not as prefet for a table, while perhaps not as prefet for a table, while perhaps not as prefet for a table, while perhaps not as prefet for a table. haps not as perfect for catching some flaky

gold as the rougher wood surface, is better than the latter for concentrating sulphurets, and equally good for fine gold. A steady circular shake without revolving, alternated with a reciprocating circular motion, settles all heavy mineral into the central depression, and an immediate rapid wash of the water towards one side carries off the sand in fan shape to the edge leaving the gold or sulphurets showing at the apex of the cone of material. For hand tests on a weighed quantity, it is very convenient to drill a small smooth hole, say 16 of an inch, in the very center of the batea, and put a small cork or wooden plug in from below, flush with the inside surface, to close while settling and spreading, then remove the plug, holding the batea over an evaporating dish, and wash down through the hole by a fine jet from a wash bottle all the clean mineral showing. The plug is then again put in, a little water put on the batea, and the mineral again well shaken, settled and spread, and the mineral washed out below; the process being repeated, until no more mineral can be separated. A flat-shaped evaporating dish is sometimes used for these hand tests, but it is difficult to get one of good form, as any slight shortening of radius of the curve near the edge is fatal to good work, by necessitating a steep inclination to wash off the sand.

(D) The total losses from fine gold in the slimes, are practically covered already by the sizing test (B), which will give the proportion in the slimes below 100 mesh, but in this would be included a loss due to sulphurets, which can be avoided in large measure by concentration. A careful concentration test on the slimes alone will then establish the approximate loss due to fine gold. The loss of fine, or "float" gold as it is often called, when its limit is established by the above tests, will usually be found, on calculation of percentage of weight involved, to less serious

than imagined on most gold ores.

(E) To determine whether the fine gold in the slimes is amalgamable by a more effective sytsem than copper-plate process, is only worth while in cases were above tests show that there is a profitable commercial advantage in adopting a more complicated process: for it is ridiculous to lose sight of the question of profit in the search after a perfect result. Where the loss is very high in the slimes, it will doubtless be found also high in the coarser sizes of taillings; and, as a consequence, it becomes really a question of another system of treatment for the original ore, not solely of the slimes; it can therefore be treated under the head of "gold in a condition not susceptible of amalgamation on copper,' The best test of the highest amalgamation obtainable is by use of an amalgamation pan, either large or small. Small laboratory pans are made, which can be run either by hand or from any running shaft and will take a charge of 3 to 5 lbs. of ore. These small pans, if properly constructed and run, will give results closely approximating mill work by pan amalgamation.

#### TESLA'S GREAT INVENTION..

The proof as to the invention rests upon the statement of Tesla that he has made it. He has not disclosed the device through which he claims the heat of the sun can be utilized to take the place everywhere of artificial heat. The New York World, in one of its issues, has a picture of a boiler on which the rays of the sun are turned, and in a manner so condeused as to set boiling the water within, and, consequently, resulting in the

production of steam. With the steam so produced, the power is furnished to operate any and all machinery or engines propelled by steam produced by the use of the various kinds of fuel. Tesla claims that this can be done anywhere in the world. The chief use is in generating or gathering electricity which he claims can be stored in sufficient quantities to supply power during the time when the sun does not shine.

Tesla is recognized as one of the ablest scientists the world has ever produced, and as a successful inventor, such wonders have been discovered of late years in regard to the forces of nature, and of the means of utilizing them for man's uses, that we are prepared to believe almost anything that a man like Tesla claims he has invented. The chief value of his invention is in the saving of fuel, and, if it proves to be as successful as he predicts, there will be very little demand for wood, coal or fuel oils. He claims that after plants have been constructed, heating and lighting of houses and the running of machinery will be done at a very trifling cost.

This invention will be most useful in localities where there is the most sunshine. The generating or gathering of electricity will be so continuous that comparatively little storage will be necessary. It will be of immense value in mining, as it will remove in very large part the cost of hoisting and milling ores, for fuel is an item of great expense in all mining operations where ores have to be taken from the bowels of the earth, and often

from great depths.

The claim is that the invention has proceeded successfully in the experimental stage, and that he is only waiting to make it more perfect before he makes his device known, that as soon as he has perfected it, he will have his invention patented, and will give it to the world in a way that will prevent it from becoming the property of trusts and monopolies. Tesla is a humanitarian, and is not working so much for mouey as for the benefit of mankind. It is to be hoped that what he claims to have discovered will do the work which he claims it will.

We are in receipt of a number of catalogues from Fraser & Chalmers, in which are described the various appliances for mining, milling, concentrating and the general reduction of ores. There has been many improvements of late years in mining machinery and also other tools pertaining to mining. Some of Fraser & Chalmers' catalogues contain a great deal of useful information on the different processes used in the extraction of gold and silver ores.

The largest gold strike made in 1897 was in Montana, on Upper Log creek, where a ledge of rock running many miles and assaying \$100 per ton was found. Some prospectors used plows and scrapers to uncover the vein. The number of mills reported in this State for 1896 was 548, with 6622 stamps. For 1897 it is estimated the stamps equaled 8000. In 1898, owing to the revival in mining, it will be within bounds to add 20 per cent. in increased stamp capacity.

Reports from all mining sections in California indicate that more assessments have been completed for 1897, and with a less percentage of lapses, than for many previous seasons. This is indicative of the great interest being taken in all mining matters and of the restored confidence in the industry.

#### California Vigorit Powder Works.

The California Vigorit Powder Company is now in active operation at its new plant at Point Isabel, Contra Costa County, California. They have all the modern appliances and modern machinery used in manufacturing high explosives of all grades, which they are putting out under the old brand of the "Vigorit." This brand has been in the market for a number of years and is well known. The powder consumers are asked by the California Vigorit Powder Company to give their brand a trial and find out for themselves that it is a strictly first class A No. 1 article. It is guaranteed fully of the strength of nitroglycerine that it is sold under, and parties buying 40 per cent powder will be sure they are getting the full strength.

three days. This allows each tank to be filled and discharged twice each week. The solution containing the gold is run through a long narrow tank with partitions, and filled with zinc shavings on which the gold is precipitated; the solution being pumped back to the storage tanks, and fresh cyanide added to keep up its strength. The zinc shavings are made by putting a number of circular sheets of metal together in a lathe, and with a cutting tool turning off a multitude of fine shavings which offer a great surface for the precipitation. Tanks are made of white pine with staves  $2\frac{1}{2}$  inches thick and 4 inches wide, and bottoms of 3 or 4 inch planks dowelled together. Filters are formed by slats laid over the bottom of tank, with spaces between filled with pebbles. All pipes and pump fit-

give comparative details of cost for reference:

Tons (2000 lbs.) of tailings treated Assay contents in gold (fine) Extraction of gold (fine) Extraction			ies i	ent
Wages, white and native (including food)	0.000	1049 4838	68	ton
25.451	54	1000		

In the case of the Durban-Roodepoort Gold Mining Co. for 1893, working on 79,765 tons of tailings, the average extraction was 79 per cent of the assay value of 6 dwts. 9 grains per ton, and with an average cost per ton of 6 shillings 43/2 pence per ton or \$1.53½.

Shillings 434 pence per ton or \$1.53½.

Concentrates from the Frue Vanners, consisting of simple iron pyrites through which



CALIFORNIA VIGORIT POWDER WORKS, POINT ISABELLA

#### The MacArthur-Forrest Cyanide Process.

This process is known as the MacArthur-Forrest process. It consists in treating an ore with a solution of cyanide of potassium until the gold is dissolved, and precipitating the gold from the solution on finely-divided zinc. It is most successful on ores containing finely-divided gold in a free state. When the gold is chemically combined with baser compounds, or when it is merely associated with most of the copper and antimony ores it cannot be economically extracted. Coarse gold is acted on too slowly for practical working, and clay present in an ore is a cause of mechanical difficulty in treatment.

The process is either by percolation or by agitation; the former for tailings and light ores, the latter usually only for heavy ores, or concentrates, or coarser gold. A typical plant for working 2000 tons of tailings per month may be arranged with 12 tanks each 18 feet in diameter and 4 feet 9 inches deep inside. Six of these are used for leaching, three for storage of liquor, and three for receiving solution. The leaching vats have ordinary filter bottoms and take a charge of about 40 tons of tailings. If the tailings are at all acid, as frequently occurs from weathering, a wash of alkali (usually lime) is given. In filling the tanks a small quantity of lime is sometimes added to each car of tailings. The solution containing say four-tenths of 1 per cent of cyanide of potassium is added and allowed to remain 24 hours, after which a weaker solution is added, followed by wash water, and completing the leaching in about

tings are of iron; brass or other alloys of copper and zinc being avoided. The precipitating boxes are carefully made of selected wood. In some of the African mills tanks of 25 to 40 feet in diameter are used. They are raised on masonry to allow cars to run under them, and have bottom openings.

The consumption of cyanide varies (in South Africa) from 1 to 2 lbs. per ton of tailings treated, and the cost of treatment in large works varies from 5 shillings (\$1.20) to 8s. 4d. (\$2) per ton of 2000 lbs. The following figures from the annual report of the Robinson Gold Mining Co. for the year 1893 will

the gold is apparently perfectly free, though fine, are treated by the cyanide process successfully; but to do this requires a greater consumption of cyanide than is the case with tailings. The South African ores seem particularly to lend themselves to cyanide treatment, for in many other gold fields no such economical results can be obtained. Outside of the adaptability of the ores to the process, the great capacity of the stamps (4 to 5 tons per 24 hours) and comparatively coarse screens used, with overcrowding of plates and concentrators resulting tends to produce a grade of tailings necessitating a second



CALIFORNIA VICORIT POWDER WORKS, "THE MILL"

treatment. It is necessary in all new cases

treatment. It is necessary in all new cases to test ores or tailings as to adaptability of the cyanide process. For this the following notes are given by Mr. MacArthur:

An average sample of the material is ground to 60 mesh, and tested for acid soluble salts by washing. If the solution shows an acid reaction, leach a weighted quantity with water until no further acidity is shown and determine how much alkali (generally caustic soda) is required to neutralize the washings. This gives the soluble acidity. The residue is covered with water, and a deci-The residue is covered with water, and a decinormal solution of caustic soda is added until the water shows alkilinity by litmus paper test. This gives the latent acidity, the total acidity being the addition of the soluble and the latent. Put 200 grains of ore and 400 grains of a 1 per cent solution of cyanide of potassium in a bottle, and agitate for ten minutes, then filter off the solution and determine the loss of cyanide. The decinormal solution is made by dissolving 40 grains of pure caustic soda in 10,000 grains of distilled water. Of this solution 10 grains of distinct water. Of this solution 10 grains is required to neutral-ize 0.049 grains of sulphuric acid. When au ore shows appreciable amount of acidity it is advisable to neutralize with alkali before testing for cyanide consumption and gold extraction. To determine the quantity of cyanide in a given solution make a standard solution of 180 grains pure silver nitrate in 10,000 grains distilled water. Place a given quantity of liquor to be tested in a small flask, add a few drops of dilute solution of potassium iodide, and titrate with the standard nitrate solution until a slight opalescence is seen.

The number of grains of solution required multiplied by 0.013 will give the number of grains of cyanide of potassium.

To test an ore of known assay value, after

neutralizing if necessary take a weighed quantity and leach both by filtering and by agita-tion with varying percentages of cyanide solution from 0.25 to 1 per cent in strength.

The Pelton Water Wheel Company reports a large run of business for the last two months of 1897. Among the more important shipments may be mentioned:

Wheels, governors and connections covering a 2000 h. p. plant for San Rafael paper mills, Mexico.

Six wheels for various other localities in Mexico.

A 1200 h. p. wheel with governors and accessories for an electric transmission plant for Petropolis, Brazil, this being a duplicate of their former plant.

An electric power transmission plant for Frujillo, Brazil.

Seven wheels, with governors, pipe lines and accessories, to operate tea and coffee plantations in Java.

Three wheels for the Ruby mines in India. Two 500 h. p. wheels for operating mills in Tasmania, Australia.

Three 1000 b. p. wheels, with governors and accessories, for the Yuba Power Company, Marysville, Cal.

One 200 h. p. wheel for operating the mill of the Dexter Gold Mining Company, Tuscarora, Nevada.

Nine wheels for various mining operations in California.

A large number of orders are in hand, making the outlook for the present year very encouraging.

#### The Little Alaska Gold Washer.

The latest novelty in gold saving devices is the Little Alaska Gold Washer, invented and manufactured by T. J. Burke, of 329 East 2nd street, Los Angeles, Cal. It is a perfect gem in its line. There is nothing to equal it. It will handle any kind of material from the grass roots to bed rock, and will wash the gold out of the crevices of large pieces of rock. There are no screens or grizzlies used. There is no need of a dog train to pack this machine to the Alaska gold train to pack this machine to the Alaska gold fields, as it is so small that it can be packed



THIS VIRW SHOWS THE MACHINE READY FOR OPERATION

in your grip. The weight is only 7 pounds. It can be taken apart in a few minutes and set up again in equally as short time, and is then ready to commence prospecting. If there is a scarcity of water, it does not inter-fere with the workings of this little wonder as the same water can be used over and over again. It can be worked on the beds of streams and lakes, in from one inch to twenty inches under water, and save all the gold put into it. Actual tests made in Los Angeles, Cal, show that from 8 to 10 tons per day can be put through the washer, and save a larger percentage of the gold contained therein than any other machine.



THIS VIEW SHOWS THE MACHINE WITH TROUGH FOR THAWING PROZEN GROUND.

One of the principal features indicated is One of the principal features indicated is the simple manner in which it can be oper-ated—a few small rocks and pebbles are put into the bottom of the pan and form a perfect catch for the gold. Over the pebbles are placed a few larger rocks, (about the size of an egg) which serve as an agitator. The material to be worked is then thrown in, and a stream of water directed over it The oper-ator then grasss the handle with one hand. ator then grasps the handle with one hand, sets up a motion and throws the gravel, sand, soil, clay, mud and slush-everything goes

in with the other. It is only necessary to make a clean-up once or twice a day. Don't fail to investigate this simple but truly wonderful device. It will work as well in the hands of a novice as the experienced

For particulars, address the Russell Hardware Co., 441 South Broadway, Los Angeles,

#### Silver-Plated Amalgamatiug Plates,

The greatly increasing demand for these plates by gold miners has demonstrated their superiority over all other methods for saving gold, in quartz or placer mining, particularly fine or float gold. These plates are in great demand in all the Pacific coast mining regions from Alaska to South America, the Rocky from Alaska to South America, the Rocky Mountain mining States and Australia. Denniston's San Francisco Plating Works, 653 and 655 Mission street, San Francisco, of which Mr. E. G. Denniston is proprietor, is constantly filling orders for them, sending out a great many thousands of square feet every year to gold miners all over the world. The plates for all the large stamp mills in Alaska were made at this establishment.

Mr. E. G. Denniston is the pioneer in this

Mr. E. G. Denniston is the pioneer in this line of business, having established his works 35 years ago, and has received every first syears ago, and has received every many premium awarded for silver-plated plates at the fairs held on the Pacific cost, having received 26 silver medals. The reputation of his plates is world-wide, he having been successful in competition with all others. Only the best Lake Superior copper and refined silver are used in their manufacture. They are made of any size, plain or corrugated.

The great success of Mr. Denniston's plates

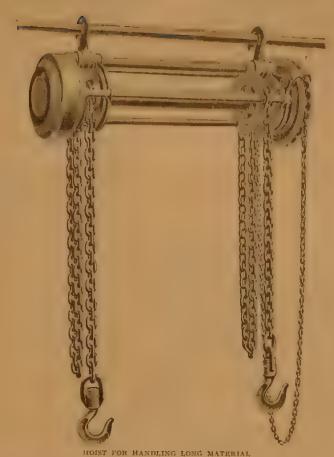
is due to his thorough knowledge of the business and possession of the best facilities, also to adhering strictly to agreement in depositing full weight of silver on every order.

The work done at Denniston's San Francisco Plating Works consists of gold, silver, platina, nickel, brass, copper and bronze plating on every description of metal work. The work done is first class, and done at lowest possible prices.

Parties wishing to purchase silver-plated mining plates will find it greatly to their advantage to get Mr. Denniston's prices before purchasing elsewhere. Send for circular.

It is said that the hottest mines in the world are those of the famous Comstock lode. On the lower levels the heat is so great that the men cannot work over ten or fifteen minutes at a time. Every known means of mitigating the heat has been tried in vain. Ice melts before it reaches the bottom.

The cruiser Chitose, built for the imperial Japanese navy, was launched Saturday, January 22, 1898, at 10:25 a.m., from the ship-yards of the Union Iron Works in San Franyards of the Union Iron Works in San Francisco. The contract for the construction of the Chitose was signed at Washington, D. C. December 3t, 1896, by H. T. Scott for the Union Iron Works, and Minister Toru Hoshi signing for the Imperial Japanese government. The first piece of keel was laid on May 3, 1897. The first rivet was driven on June 26, 1897, which shows the rapidity with which the Union Iron Works can turn out a mamment piece of work of any class. Their mammoth piece of work of any class. mining machinery is turned out in just such short order as their ships, and every piece of material is thoroughly tested before it is utilized. All work is guaranteed that comes



#### HOLE FOR HAMMAN LONG MATERIA

### Special Triplex Hoist for Handling Long Material.

The accompanying illustration shows a special form of the Weston Triplex Chain Block made by Yale & Towne Manufacturing Co. of Stamford, Conn., especially designed for handling long material, such as bars, beams, lumber, etc. It consists of a triplex block with its mechanism separated into two parts coupled by means of shafts and separators and provided with two hoisting chains, the combined strength of which is equal to the lifting power of the block.

The hoist can be so built as to separate the two hooks any distance desired, according to the character of the material to be handled. The hoist may be hung from a fixed support, as in the illustration, or from a trolley on an overhead track or crane, as desired.

The hoist thus provided with two lifting chains and hooks always moving together, is adapted to a wide range of uses, and for the handling of long material is much better than a block with a single lifting chain. The latter is sometimes used with a yoke having hooks at each end, but this arrangement is less steady than the one shown in the illustration, and necessarily occupied much more head room. The triplex hoist with two lifting chains will doubtless commend itself for a wide variety of uses.

The number of mineral claims located in California during 1897 will fully equal 10,000. This estimate is based on the showing of fourteen counties out of the thirty-three gold-producing counties in the State. These counties produced in 1896 \$10,500,000 in gold out of the total of \$17,181,500 officially reported

for the State. The counties reporting in this section are: Riverside, 1216 locations; San Bernardino, 301 locations, and San Diego, 937 locations.

#### WEBER GASOLINE OPERATED PUMPS.

The Weber Gasoline operated pumps for mines and mills, city water works and irrigation plants of all kinds and sizes are so well known that a description here seems out of place, but for those who are not acquainted with them we will state a few facts.

The cost of operating the Weber Gasoline operated pump is about one cent per indicated horse power per hour, gasoline at ten cents per gallon, varying, of course, with the cost of 74 degree gasoline in different localities.

The Weber requires only a few minutes' attention each day, for filling oil reservoirs and cleaning bright parts. It requires no special attendant. Any one of ordinary intelligence can start and take care of the engine and pump.

These pumps are guaranteed by the manufacturers to be made of the very best material and of the very best workmanship, and any parts found defective will be replaced free of charge for one year from date of sale.

Another important fact to be considered is that changes in the temperature do not affect the engine's running, which has a steady and uniform speed. All parts of the engine and pump are interchangeable and can be replaced without any inconvenience.

For further particulars and catalogues write to the Weber Gas and Gasoline Company, 434 Southwest Boulevard, Kansas City, Missouri.

### CORRESPONDENCE

#### TUOLUMNE MINES

#### East Belt

THE PROVIDENCE MINE

will have their new hoist in full running order by February 1. This mine looks very well.

THE GRIZZLY MINE.

Sinking main shaft continues with three shifts. The vein is large and shows free gold after each blast.

THE DEAD HORSE MINE.

This 20-stamp mill is running on full time. Mine looks well.

THE LADY WASHINGTON.

Everything around this mine is activity and bustle. Main tunnel now entered about 900 feet.

THE CULLERS MINE.

Arrastraville, crushed 20 tons of rock that yielded value of \$1000.

A number of mines have suspended operations, owing to lack of water, the severe frosts freezing up the supply. Milder weather is now looked forward to, when all the mines in this belt will be in full blast.

THE CELEBRATED BONANZA MINE

is preparing to get things ready for a resumption of work, anticipating a plentiful supply of water, their motive power. This mine is in the town of Sonora, and has produced millions.

THE COLBY MINE

took out \$5000 last week. This mine extracted \$41,000 a short time ago, and will be heard from soon with another big strike. This mine may be said to be in Sonora.

The mother lode mines are all doing well that are working. The water famine seriously affects the output from the majority. Those using steam are safe and in full blast. Electric plants are being rushed along, to give that power in the absence of water. Gasoliue and crude petroleum is the coming power, being far cheaper than any other kind on earth.

Argus.

#### MEXICO.

TOPIA, ESTADO DE DURANGO, January 15, 1898.

EDITOR JOURNAL: Yesterday there came to the government assay office located here an Indian, who said he had a great copper vein, and asked of what use it was. The assayer, Don Comanchi Ortez, told him he



WEBER GASOLINE OPERATED PUMPS

wanted to see samples of the ore. The finder said, very well, he would bring samples. In an bour he returned with a piece weighing 104 1/4 pounds, which was covered outside with a kind of iron rust. On further investigation it was found to be nearly solid gold, gation it was found to be nearly solid gold, with streaks of quartz running through it. He had other specimens with him that showed free gold. The piece was bought by the agent here at \$13.728, Mexican silver. He had to borrow from all the merchants in the place to get the amount. Great excitement prevails here, and the Indian can go nowhere without being watched. He is freely spending his money and claims he can get as ing his money, and claims he can get as much as a burro train can pack. We will await further developments.

Mr. Perry Fuller has discovered very rich "diggins" on the Rio Culican, from which he takes 75 cents to \$4 gold per pan. These "diggins" are located over 150 feet above the present river bed, and are no doubt the bed

of an ancient river.

There are over 300 placer mines located now between Culican and Topia, and all have

from 20 to 75 peons working.

This is an old district and was worked by the Spaniards at an early date, and has a legend of being very rich. All the prospecting being done of late has been for silver. The formation here is similar to the coun-

ties of Amador, Placer and Eldorado in California. The purchases of gold (placer) at the Culican mint amounted to over \$196,000 in November and December, all from placers in a radius of 60 miles of Culican.

There is now four locating parties here for the I. M. Railway, the Occidental, the Sina-loa Southern, and the Gurney M. & M. Co. The company who builds first will no doubt secure the cream of the country. There are

now over 4000 mules packing supplies from Culican to Topia and the districts of Culican.

Mr. M. B. King, a mining and civil engineer, is now in this district making a report for the government. Mr. King is a Californian, being from Placerville, Eldorado county, and is the only foreigner in the employ of the Mexican government in topographical work. On being interviewed the other day as to the resources of this country and district, he said he could not say very much, but thought it would develop into an Eldorado which the past could not equal. The district is located at an elevation of 2000 to 10,780 feet above sea level.

Since starting this letter, Mr. Perry Fuller, chief engineer of the Occidental Railway Company, has brought in a nugget which weighs 8¼ pounds, taken from his Monte Forgo claims. He says the Gringoes are so numerous that it takes a good Winchester to keep them out of his claims. He remarks that an old Mexican widow lady has discovered 1580 feet above his claim, a lode runered, 1580 feet above his claim, a lode running over \$800 per ton gold, four feet wide and of white quartz. "CULICAN."

#### Miscellaneous Mining News.

#### ALASKA.

About one thousand men are at work on Bonanza Creek, Alaska, a like number on El Dorado, 500 on Hunrer and others. The ground is sufficiently frozen for active mining, and shafts are sinking at a lively rate.

With 7,000 000 tons of ore in sight, the Treadwell mine on Douglas Island, Alaska, is soon to have the biggest stamp mill in the

world. The mill will be doubled in capacity to 300 stamps. The next largest mill is in South Africa, of 280 stamps. The Treadwell mines its ore at \$1 per tou, and produces \$125,000 per month.

#### CALIFORNIA.

#### KERN COUNTY.

The following deeds filed for record at Bakersfield, Cal., will show considerable activity in transfers of mining interests in Kern county last week:

Angus Matheson to C. A. Small, 1/3 interest Gold Lining, and 3/3 interest in the Mar-

garet mines, Rand district, \$1.
Oliver S. Bond and wife to Carrie Dalton
Bond, trustee, all interest, in Gipsy, Climax, Victor and Index mines, all in Rand district,

Alex. McDonald sr. to W. C. Wilson, boud for deed for Isabella mine to May 13, 1898,

\$1000.

B. Maginnis to E. B. Maginnis, all interest in Rustler, San Diego, Agnes, Sky Scraper, Sunshine, Minnehaha, Defender, Little Bonanza, Single Standard and Rose mines, Rand

D. A. Helbing and A. Shier to M. J. Con-ley, interest in General Grant, McKinley & Ketchum mines, Rand district, \$10. E. A. Bretzner et al to D. A. Helbing and A. Schier, same mines as last above, \$300. H. H. Winchell to Clark W. Roe, inter-

est in Brigham, Smuggler and Old Dominion

mines, all in Rand district, \$1.

J. W. Ragesdale to W. J. Langdon, all interest in Looking Back, Iron Clad, Black Sheep, None Such and St. Julian mines, all in Rand district, \$1.

F. N. Hubbell to F. E. Potts, 1/2 interest in

Amador Boy, Rand district, \$10.

Carrie D. Bond and Husband to Mrs. S. M. Reynolds, Gypsy Queen mine, Rand district,

C. H. Barlow to C. F. Snyder, Jennie Lind mine, Goler district, \$10. O. H. F. Hansen and J. W. Wilson to C. H. Fairchild, 1/4 interest in Surprise No. 1 and No. 2 mines, in section 4, township 30, range 21, \$1.
Same to Geo. H. Garlock, ¼ interest in

same mines as last, \$1.

In the stringer district, near Randsburg. fifty dry washers are at work; in the Pumpkin and Goler districts as many more. These average about 12 cents per run of fifty shovels each, with forty to fifty runs per day.

#### LOS ANGELES COUNTY.

#### Acton Items.

The mines of Acton are looking well and the ore is becoming richer every day. Development work is being pushed upon the principal mines, and on the whole Acton is becoming a great mining camp. A ton of ore sampled in Los Angeles from the Mohawk Acton mine averages \$30 per ton. The company will now get out a carload of ore and ship it to Selby, of San Francisco, Cal., for treatment.

Walter L. Hastings is prosecuting development work on the Esperauza mine.

Work on the Red Rover is progressing finely. The principal work there now is drifting and developing.

There is considerable talk of erecting a good custom mill to work the ores of the Acton mining district. A custom mill at Acton would undoubtedly be a paying proposition, as there are a number of mines without reduction works which could supply a great quantity of ore.

J. H. Smith, of Los Angeles, is deeply interested in several good mines of Acton, and has commenced development work upon some

If the hopes and proper notifications of a number of experienced mining men of this section are to be accepted as the basis of an opinion, it is not exaggerated to say that the San Gabriel Valley is on the eve of a mining boom of its own.

Mr. Samuel Miller, a responsible and respected resident of Glendora, a town about twenty miles east of Pasadena, states that important discoveries of gold ore have been made in the mountains northeast of the village. The location named is at the head of Dalton Canyon, about 3500 feet above sea level where claims have been worked quietly but assiduously for some months.

On one of these claims, Mr. Miller states, the owner has unearthed a ledge of quartz that assays \$17 per ton in gold. He adds that the assays have not been taken from selected spots in the ledge, but that it seems to be uniformly rich as far as uncovered. Work in the canyon is being diligently prosecuted, and a little further time will determine the full inwardness of this valuable discovery.

#### NEVADA COUNTY.

One of the oldest and best paying properties in the state is the Empire mine, situated in Nevada county. It was located in 1852, and has produced over \$7,000,000. Its monthly output during the past several years has averaged \$60,000. The property gives constant employment to 250 men.

#### RIVERSIDE COUNTY.

It is not generally known that the area of the lands embraced in what is commonly called the Perris mining district, and of which the Pinacate mining district is a large part, is nearly 250 square miles. This is a large territory, and the wealth beneath its surface is probably only just beginning to be realized.

Over \$500,000 has been invested in this dis-

trict in mining machinery alone.

#### SAN BERNARDINO COUNTY.

#### Fifty-Stamp Mill,

The Randsburg-Santa Fe Reduction Company, of Barstow, California, have placed an order with the Colorado Iron Works Company, of Denver. Colorado, for a 50-stamp mill concentrating plant, including also a com-plete ore-sampling plant. This mill will be a modern one throughout and will be completed and ready for operation about the first of May.

#### COLORADO.

#### Crippie Creek Items.

The Ingham is outputting at the rate of about 15 tons of \$30 ore per day.

Burton & Co, sent out a five-ton shipment last week of \$50 ore from their lease on the south end of the Delmonico, on Bull hill.

Carruthers & Vaughn have now out about 20 tons of five-ounce ore on the Rocky Mountain, situated on the west slope of Beacon

A shipment was made last week from what is known as the Weir lease, on the Dante. The ore will run in the neighborhood of \$50

Murray & Co. have taken a lease on the Little Johnny, situated on the west slope of Beacon Hill. They have commenced developing their ground with two shifts.

Three shifts are now being worked on the Ophelia tunnel and progress into Gold Hill is at the rate of about 10 feet per day. This big bore is 8x9 feet in the clear.—The Colorado Springs Mining Investor.

The following are the carload shipments of ore from the Rico district in Dolores county, by mines, for the year 1897: Grand View...... 14 Swansea...... 39 A. B. G..... 

 Wittle
 1

 Emma
 14

 Rico-Aspen
 3

 World's Fair
 1

 Alleghany
 1

 Iron Mine
 6

 Hope & Cross
 4

 Maggie
 2

 Grand Duke
 0

 Wellington..... Clark 1
McLaughlin 1
Smuggler 4

#### MICHIGAN.

Total.....470

A party of Finlanders have located a body of hematite ore assaying 6.28 iron and 0.018 phosphorus on the high hill south of the Iron Cliffs furnace site near the Foster mine, in the Marquette Range.

The miners about Ishpeming have received a ten per cent advance in wages; those about Negaurice, who took little part in the demand recently made by the Miners' Union, are endeavoring to get a similar advance.

About 200 men are at work at the Section 21 mine. It has been several years since so many miners were employed during the winter in the mines about Ishpeming.

The Cambria mine in the Marquette Range has been making steady shipments by rail to Chicago.

It is said that Webster Camp & Lake are to furnish a new hoisting plant for the Aragon mine in the Menominee Range. It will be supplied with Pitkin's patent drums and will be almost a duplicate of the one that has given so much satisfaction the past season.

The incorporators of the Crystal Falls Iron Mining Co. are James Corrigan, Paice Mc-Kinney, Stevenson Burk and S. C. Bennett of Cleveland. The company will operate the Crystal Falls mine in the Menominee Range that has been transferred to it by Corrigan, McKinney & Co., the former owners.

#### MISSOURI.

#### Jonlin Ore Market.

The weather during the past week has been unusually favorable for mining operations and the output of both lead and zinc ore was very The top price paid for zinc ore delarge. The top price paid for zinc ore declined \$1 per ton to \$23 per ton, and about 15 carloads sold for that price. The cut on the lower grades was only 50 cents per ton. There were about 400 tons of zinc ore left over, as several of the operators would not stand the cut in price. The price of lead ore was \$22.50 per 1,000 lbs. in the bin, the same as last week. There is quite a surplus of lead ore in the district. As compared with the preceding week the sales were greater by the preceding week, the sales were greater by 1,262,670 lbs. of zinc ore and 236,440 of lead ore, and the value was greater by \$16,179. For the corresponding week of last year top grade zinc ore sold for \$21.50 per ton, and lead ore for \$16 per 1,000 lbs., delivered, but the sales were less than the past week by 1,742,150 lbs. of zinc ore and 204,220 lbs. of lead ore, and the value was \$36,624 less. The following are the sales of lead and zinc ores from the different camps in the district for the week ending January 8th, 1898: Joplin, zinc, 1,716,960 lbs.; lead, 431,390 lbs.; value, \$28,597. Cartersville, zinc, 1,310,470 lbs.; lead, 312,680 lbs.; value, \$20,140. Webb City, zinc, 806,180 lbs.: lead, 45,420 lbs; value, \$9,084. Oronogo, zinc, 358,870 lbs.; lead, 15,910 lbs.; value, \$4,435. Scott City, zinc, 107,360 lbs.; value, \$2,039. Alba, zinc, 115,320; value, \$1,334. Bellevue, zinc, 20,190 lbs.; lead, 4,440.; value, \$321. District totals for last week, zinc, 7,920,350 lbs.; lead, 1,252,840 lbs.; value, \$111,135.—Engineering and Mining Journal. from the different camps in the district for the and Mining Journal.

#### MONTANA.

Close estimates of Montana's metal ontput for the year make the total \$52,000,000. The production of copper easily leads, the amount being estimated at 250,000,000 pounds for the year. Practically all this copper was produced from the Butte district.

The history of the copper industry in Montana, which is the history of Butte, dates back only fifteen years. The active search for copper began in 1881. From that time the daily output has increased from 300 tons to 10,000 tons.

The following figures show the production of copper in pounds fine for Montana from

1882	9,058,284
1883	24,698,346
1884	43,098,951
1885	67,797,861
1886	57,611,621
1887	78,699,677
1886	97,897,968
1889	98,222,444
1890	110,955.733
1891	112,359,320
1892	161,051,477
1893	154,300,100
1894	183,094,755
1895	194,768,925
1896	228,958,164
1897 (estimated)	250,000,000

Taking copper at an average value of 11 cents, the total value of copper alone taken from Butte is 200,000,000.

#### NEW MEXICO.

Word comes from Santa Fe, N. M., that an immense copper strike is reported in the old. Hanover mine, near Silver City. There is said to be more than 5,000 tons of ore exposed and ready for stoping, and this with only a small amount of development work done by extending the ancient only a small amount of development work done by extending the ancient workings in the mine. A rich gold strike is also reported today from Amizzett, Taos county. Alex Gusdori, the Taos merchant, brought in samples of the rock, which yields \$500 per ton. He says the new find shows 24 inches of the high-grade ore and six feet of \$22 ore at the bettern of a ten foot shoft. The discovery of bottom of a ten-foot shaft. The discovery of 18 inches of tale in the Red River country, which assays four ounces in gold, is also reported by H. J. Young of Taos county.

The deal was finally closed last week for the sale of the Copper Glance mine, located in New Mexico, about forty miles southeast of Taos, to an eastern company, composed of Boston and Chicago capitalists. This mine is one of the most remarkable deposits of copper ever found in the west. In the main body of the property there are six veins, showing in narrow streaks at the surface, which gradually widen as depth is gained, until at the bottom of the main shaft the ore body is 41/2 feet wide, which runs from 30 to 70 per cent cop-

A company has been formed with a capital of \$1,500,000, and A. W. Tennant, who had secured an option on the property, receives \$40,000 in cash and \$200,000 of the capital stock, \$500,000 of it to be set aside for working capital. The company proposes to commence work on the property at once.

A 200-ton concentrating plant is to be erected upon the mine, and development work

will soon be commenced in earnest.

An Excellent Property,

The deal for the Albemarle property was concluded in Boston several months ago and the enterprise is backed by some of the best business men in Boston. The promoter, L. A. Coram, is well known in mining circles as a successful miner, who thoroughly under-stands the mining business and is in close touch with the strongest financial men of the country.

The Albemarle group embraces 13 claims in the Cochiti district of New Mexico, all of which show mineral of the same character, a hard quartz carrying gold in fine particles, the distribution of which is remarkably even throughout the rock. Tests made while the deal was in progress show it to be one of the most remarkable instances of thorough mineralization ever found in the country. The allization ever found in the country. The lowest return made was \$6 per ton and the highest \$28, and the average value is maintained in every mass of rock broken down. Tests by the cyanide process give a return of a saving of 97 per cent of the gold values and a slightly less percentage of the trifling amount of silver carried in the ore.

But the most important facture of the arm

But the most important feature of the en-But the most important teature of the enterprise is the mill which is being erected on the ground for the treatment of the ore. This will be entirely of steel, lined with asbestos felt, insuring immunity from fire, and the requisite warmth in cold weather. It is the first steel structure erected in New Mexico and has no counterpart in Colorado. The Mercur mill of the Mercur district of Utah is on the same plan and in many respects has served as a model for the Albemarie structure, the general plan being on the same lines.

#### SOUTH DAKOTA.

LAWRENCE COUNTY.

All of the mineral claims in the Bald Mountain district are owned by a few large companies. The largest companies operating the northern part of the district are the Golden Reward and the Horseshoe. The southern part is owned and is being prospected by the Deadwood and Delaware Company. The ore bodies thus far explored have become richer the further south they go.

It is said that the Gill Edge is the richest ine in Strawberry Gulch. It is owned by mine in Strawberry Gulch. M. L. Day of Deadwood. A shaft is down 60 ft., and four miners ship five tons of ore a day. The average value of the ore is very high. The mine was located years ago, but the only good vein ever opened was found a few months ago.

In the Yellow Creek district of the Hills development work is being carried steadily forward. On the Ophir group of claims, owned by a number of Lead men, drifting is being done from the bottom of a 65-ft. shaft, which has been carried about 300 feet, with tavorable indications. Ore assays have been very good.

#### UTAH.

We are informed by a prominent mining broker of Salt Lake City, Utah, that the fol-lowing mistakes were made in our list of dividends paid by mining companies in our issue of Jan. 15th: Bullion Bach paid \$170,000 instead of \$70,000; Mercur paid \$311,000 instead of \$286,000; Silver King paid \$487,500 instead of \$450,000; Sacramento paid only \$10,000 and was reported by us as paying \$15,000; South Swansea paid \$82,500, instead of \$67,500. In Swansea we reported them as having paid \$50,000, while they have paid \$55,000.

Those companies left out of the list entirely

Eureka Hill.....\$200,000 Golden Star ...... 5,000 Gemini...... 250,000 Horn Silver..... The balance of the list, as far as we can as-

certain, is absolutely correct.

#### FOREIGN MINING NEWS

#### BRITISH COLUMBIA.

Another Le Roi Dividend,

The Le Roi has paid last week another satisfactory dividend of \$50,000, making au aggregate of \$725,000 in dividends to date, towards which goodly quota \$425,000 were yielded in 1897 as net profits. During last year, moreover, it is stated that out of profits \$112,000 were expended on the Northport smelter—which cost nearly \$100,000—and in permanent improvements at the mine. It is now thought extremely likely that the British America Corporation will very shortly exercise its option and buy the Le Roi.-British Columbia Mining Critic.

#### The Silver Cup.

This North Kootenay mine of the Lillooet. Fraser River and Cariboo Gold Fields Company, Limited, is now stated to be showing well. It has 108 tons of ore en route to the Everett smelter, and 300 more on the dump waiting transport to Thompson's Land.

Superintendent McNeill states that the mine is getting out 150 tons of ore per month, worth \$58 a ton, and his men are sinking gradually deeper—having now reached a depth of 200 feet—with satisfactory indications. Assuming the general correctness of the superintendent's statement, it looks as if the Silver Cup may do something fairly substantial to improve the position of this well capitalized mining company, the British shareholders of which ought to receive a good return for their early efforts directed toward British Columbia mining development, as yet wholly unrequited.

The richest strike yet made on it is re-ported from the Silver King mine, Nelson, a body of silver-bearing ore, 20 feet wide and 200 feet long being reported by the management as being struck somewhat unexpec-

#### Alberni Mines Bought.

The English company organized under the title of the British Columbia and New Gold Find, Limited, has purchased for \$150,000, with a substantial cash deposit, the mines and other property of the Alberni Consoli-dated Company of Alberni, Vancouver Island. With the English Company, Premier Turner and other well-known Victoria men are connected as advisory directors in British Columbia, and with the large amount of British capital at the command of the undertaking there should be a full and fair trial made of typical gold claims in the promising, but as yet comparatively little worked district of Alberni. The British Columbia Agency, Limited, and the British Columbia Gold Trust will also, with the aid of large capital resources, enter this year upon very important mining development work in the Alberni district, which should in consequence become an area of greatly increased settlement and general activity.

#### GENERAL NEWS

Hoskins' Hydro-Carbon Blow-Pipe and Furnace,

It has been more than fourteen years since Mr. Hoskins first introduced his Hydro-Carbon Blow-Pipe and Furnace to the assaying public, and though it was at first uphill work to convince those interested that the use of gasoline was not attended with danger, and

that his apparatus was practicable, it will be admitted by all now that his apparatus have not only revolutionized the practice of assaying in regard to the furnaces used, but the mining public has been materially benefitted.

It is also a sale during all this time he has had no successful imitators. This is no doubt due to the determination on his part that his Furnaces and Blow-Pipes shall always be the best for the purpose, and he has always been ready to meet any reasonable

demand on the part of the user.

His firm is still occupying this position, and

by addressing Messrs.
Wm. Hoskins & Co.,
Room 57, 81 S. Clark
street, Chicago, Ill., with
the request for their new catalogue, full description and prices will be found of



new designs and types of Furnaces, in-cluding Combination and Portable Fur-naces, such, for instance, as that herewith il-lustrated. It might be well, in this connection, to add that Mr. Hoskins has just been allowed protection on his new Combination Furnace, by letters patent No. 596,707, issued Jan. 4th, 1898.

#### PERSONAL NEWS ITEMS

RAILPH DILLON, M. E., is at present in Denver, Colo: Mr. Dillon is the president of the Jerome Copper Mining Co. of Jerome, Arizona.

HARRY B. ADSIT, well known to mining people in Southern California seems to have a good thing in the Iron Springs mine in the Ophir District in San Miguel County, Colorado.

HARRINGTON BLAUVRLT, M. B., formerly of Pres-cott, Ariz., has resigned his position with the Glad-iator mine, and is now located in Prescott again.

DAN MCLROD, who has been doing considerable mining in the Utah side of the line is now working the Charley Ross group in Nevada.

E. M. WADE, the well known assayer of the firm of Wade & Wade of Los Angeles, Cal., was a visitor at the California Golden Jubite: in San Prancisco last week. Mr. Wade left Los Angeles with the intention of securing mining machinery for the purpose of enlarging his assaying establishment. He expects to put in a cyanide plant; a stamp mill and a concentrating plant, to test ores and will have the most complete outfit on the coast.

C. E. EDWARDS, the well known mine owner of Okanogan Lake, B. C., made California a visit last

F. N. Hundring the Randsburg assayer sold out his place of business in Randsburg and is now in Los Angeles. Mr. Hubbell is a through metallurgist and mill man and will endeavor to get employment at one of our numerous mines or mills as mill-man.

W. H. STORMS has interested capital in the Good. Priday mine near Soulabyville, Toulumne Co., Cal., and it is expected that the mine will be rapidly developed. Machinery, for handling the ore will be placed upon the property as soon as development work warrents it.

The president of the Lost Gulch Mining Co. of Globe, Ariz., W. B. Gerrard of New York, is at the property making an investigation of the workings at the mine.

DAVID KAITH has been re-elected president of the Silver King mine of Utah, with the following as officers: Thos Kearns, Manager and Vice-President; W. S. McCormick, Treasurer, and W. V. Rice and James Ivers will serve as directors with the above officers.

RICHARD L. DUNN, the mining expert, who has been examining some hydraulic mining property in Siberia, has recently returned to San Francisco, Cal.

Chicago capital is rapidly becoming interested in mines all over the United States. It is reported that JAMES H. JAMES a Chicago mining expert has been examining a gold mining property near Swan Lake, Idaho, for a Chicago Company.

The director of the school of mines at Socorro, N. M., Prop. W. H. Skamons, opened up an assay office January 15th at El Paso, Texas, and placed his brother in charge.

SPENCER CRAIGE of Acton, Los Angeles County, Cal., is now a mining engineer of London, England, having passed the governmental examination.

HENRY BRATNORER has returned to London to-consult with the leaders of the syndicate that is about to build a rail-road over the Dalton trail from Pyra-

Exploration Syndicate of New York has sent R. G. CORNING to examine some mining properties in Mexico in which the Company is interested.

JOHN K. MACKENZIE, the well known mining man of Chicago, Ill., is reported as being in Alabama, in the interest of Chicago capitalists.

#### OBITUARY.

CAPT. HALL, superintendent of the Le Roi mine, Rossland, was, on January 3th, killed instantaneously by an accidental fail down the shaft, failing to step out from the bucket safely on to the landing. The superintendent fell a distance of 600 feet, sind almost every bone in his body was broken. The late Capt. Hall was generally popular and highly respected. He was a man 63 years old, specially skilled in mining, and a very successful manager of the great Le Roi undertaking.

#### THE MARKETS.

Now York, 1 to 27th, 1898 The following are the Silver, Copper and Lend quotations for the last two

		STLVER	OHPER	LRAD
y en	13			
	1.5		jet 100	
4.4	15		11 9	121
44	12	14	], 00	3.57
4	18	100	10.87%	11 3 3
4.4	119		1 4 1,	000
	20	. 1	10.84	3 10
44	22	4 4	0.80	. 1
44	2-1	Ast y	10.50	
18	1.6	1/2 /2	10.83	
+6	2.4		11 %	10 2 2 3
	No.	4 4	D % i	1136
	27	4 7	1 0.90	1 1/2
4.5		_		

The Silver market has ruled at low prices throughout the week although at the close it seemed to be firmer. It has been unfavorably affected by stringent money markets in India, where there has been quite an appreciable increase in the rates of discount.

the New York market has been firm, as home consumer are still provided with raw material. Quotations are Lake Copper 10% @ 11c.; for Electrolytic, 10% @ 10% c; Casting copper retail lots 10% a 10% c. The New York market has been firm,

It has been rather slow in movement as consumers are well suppled. We quote it @ \$3.621/2

#### SPELTER

There has been a large increase in the production and buyers in consequence are holding off.

New York quotations are \$3%@\$3.90 and St. Louis \$3.72½@\$3.75.

#### ANTIMONY.

It has been rather dull and we quote for Cookson's Sc., Hallett's 75/c., U. S. Star 71/2c., and Japanese 74/5 60 71/2c.

Business still continues on unchanged the size of the order.

Tines and no alteration in prices can be reported. We quote for New York ton dots 33½c, and 36c per fb and for smaller orders 35½c, and 38c.

#### PLATINUM.

PLATINIM.

Prices are now quoted at \$15 and \$16 per 62. New York. The London quotations are 58 to 60 2 per 22. Supplies are not large and prices are firm. For thom cal ware, best hammered metal, Mesna Einer & Amend of New York furms to the following quotations, the prices given below being respectively for orders of over 260 grams; for orders of over 100 and less than 100 grams. Crucibles and dishes, 57c., 58c. and 59c. per gram. Wire and foil are 55c., 56c. and 67c. per gram.

#### QUICKSH VER.

The New York quotation areat \$38.50

per flask San Francisco quotations are \$39 for domestic consumption.

#### POWDER

The market at San Francisco is fine with the current quotations.

The quotations are as follows:
For Hercoles No. 1, from 11%, to 17%, according to strength and quantity. No. 2, from 9c. to 11c., according to strength and quantity.

duoted us tomow.		
English, spot, in	bulk	 \$11.00
	sacks	. 12,00
Cumberland .		10.00

The market is quoted as follo	WS	
Refined, in carload lots, in barrels		-1
Powdered, in carload lots in sacks		
Concentrated, in car tots		3

Aluminum: No 1, 98 per cent.	ingots.	per	ib.		34@400	
No 2, 95 " "	71	- 11			31(0)330	
Rolled sheets, "					35C 111	
Alum - Nickel, "					33.0.390	
Bismuth, per 1b				51	30(9)\$1 4	
Phosphorus, per 1	b				45/6/500	
Tungsten, per lh .					700	
Tungstle acid					450	
Perro-tungsten, 6	per cen	it .			600	

Variations in price depend chiefly on

#### CHEMICALS.

There is absolutely nothing new to report, but it is expected that before the current month goes by there will be quote for spot and January \$13.75 and from buyers.

Onotations

CAUSTIC SODA.
Quotations for Caustic soda domestic
high test are \$1.75 @ 1.85 per hundred
lbs

according to brand.

Domestic, 58 percent., 56c. @ 60c., foreign 60c. @ 65c. carload lots.

### CARBONATED SODA ASH. 48 per cent., 90c and 95c, per 100 lbs. 58 per cent.

m-carbonate of soda. English, \$2.00 and \$2.25 per lb. American, bulk \$2.00 and \$2.25 per 100 lbs.,

For domestic, \$1.55 per 100 lb., less usual discounts; English,  $60 @ 62^{\circ}$  e, for spot and 65c. to arrive. Concentrated sal soda, \$1.40 and \$1.60 per 100 lbs.

CHI.ORATE OF POTASH.
Chlorate of potash is quotated at \$9.12½ and \$9.37½ per 100 lbs.

#### Acids.

Pebruary has opened with an improve-ment as compared with last year and taken as a whole, the trade looks promis-

Correspondent of the trade looks promise taken as a whole, the trade looks and vicinity in lots of 50 carboys and vicinit

#### BRIMSTONE.

Quotations at present are \$20.75 % \$21.50 per ton for best unmixed seconds, and \$20%20.50 for thirds.

#### MURIATE OF POTASH.

We quote New York and Boston, 1.75@\$1.78c. Philadelphia and Norfolk, 1.76@1.79½c.; Charleston, Savannah, Wilmington and New Orleans, for 80@ 85 per cent. basis of 80 per cent., \$1.78½ @\$1.81c in lots of 50 tons and upward.

#### KAINIT.

Business on spot has been good and Business on spot has been good and the market appears to be rising in values. At one time this week \$1.85\(\alpha\)\\$1.90 per 100 lbs, was asked for spot nitrate, but but sales were made at \$1.75\(\alpha\)1.85 is mentioned for spot \$1.70\(\alpha\)\\$1.85 for near arrivals and \$1.55 tor future shipments.

#### FINANCIAL NOTES.

The statement of the United States Treasury, on Thursday, January 6th, shows balances in excess of outstanding certificates as below, comparision being made with the statement for the corresponding date last week:

Treasury deposits with national banks amounted to \$49,280,624, in an increase of \$3,028,193 during the week.

#### Gold and Silver Exports and Imports.

At all United States ports, November, 1899, and years from January 1st, 1897 and 1806

	Coin an	d Bullion	In Ores			
		Imp.	Exp.	Imp.		
fold			A 100	6500.084		
107	\$1,500,100	83 1 1 3 4	\$ 173	\$509,071		
K147	N 1 19 18 1	D 101 1/27	197,761	4 179,640		
567.86	57,041,413	100,194,167	183,651	1,736 DES		
n fle	-					
.08	1,979,277	1,514,306	1,334	1,540,129		
4117	52,551,968	11,017,012	260,759	19,232,102		
896	56,243,791	11,221,776	892,120	16,069,271		

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department.

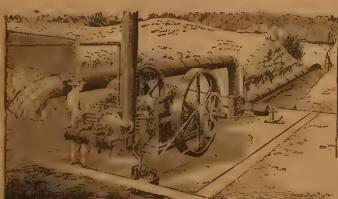
#### Gold and Silver Exports and Imports, New York.

For the weekending January 7th, 1898, and for years from January 1st, 1897, 1896, 1895:

Period	1 G	old	Silver			
	Exports	Imports	Exports	Imports		
Week	\$25,000	\$804,796	\$850,498	\$141,220		
1898	25,000	804,796	859,493	741,220		
1897	42,410	124,100	427,601	25,736		
1806	3,507,889	15,589	1,192,368	52,023		
1895	6,673,876	36,894	1,191,173	76,632		

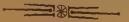
Invoice weights as taken at port of shipment per ton of 2,240 lbs. testing to the West Indies; the Silver London and South America. Of the gold import to 23 per cent. sulphate of potash, \$8.80 ed \$494,086 came from England, \$289,60 \$8.90.

### 31%====



LARGEST GASOLINE PUMPING PLANT IN THE WORLD

The illustration shows the gigantic pumping plant recently built by the Hercules Gas Engine Works the Packer Ranch, Colusa Co. 80 h.p. Hercules Engine, pumping 7200 gallons a minute, 27 feet ... Eurns Gascinie or Distillate oit. Cheapast power known, Gas, Gascinic and Oit Engines, 2 to h.p. Send for Catalogue. HERCULES GAS ENGINE WORKS, 210 Bay St., San Francisco.



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San Francisco, Cal.

#### MINING STOCK MARKETS.

SAN PRANCISCO, Cnl. Jan. 28, 1898 The market has showed a very favora-ble outlook, and holders of large blocks of stock are being materially encouraged.

Alta Con, made a fair showing; the stock is not much sought after but is held when obtained. Most of the mines on the Comstock have finished the pre-liminary or dead work.

The Union mine owners are delving in the 900-foot level. The stock is com-manding a good price and it is expected soon to go higher.

Work is still being done on the Ophic on both the Old Central tunnel level and the 1000-foot level, only it is in a westterly direction.

No work of any importance has been reported in the Hale & Norcross

The west cross-drift in the 600-foot meetic level run jointly by the Con. Virginia and the Best & Belcher Companies, is now in King.

the Best & Belcher Companies, is now in about 70 feet.
Reports of good work continue to come in, from the 550, 650 and 750 foot levels of the Occidental.
No change is not read from the Bonner shalf which is being its read by the Best & Belcher and Gould & Curry com-

Good reports are received from Savage at are not verified by the official re

Chollar-Potosi joint work is progressing rapidly. Work in the tunnel level of Potosi is being actively pushed and good success is reported, in consequence of which the stock was a good seller on last week's realist. week's market

SALT LAKE CITY, Jan. 26, 1898.

The market is fairly active, with prices in the main a trifle bearish. Pull advantage was taken by the brokers of the leading securities, and a heavy reloading was effected. Other stocks reached lower points from their own weight, and along somelines a general inloading was officted. Brokers report an increased demand from outside points for the first class securities, and assert a decided improvement in the foreign inquiry.

Early in the week Ajax sold at 38c., and at the close was strong in the bid with at the close was strong in the bid with a dealed of 10,000 shares af \$1.00 per thousand.

at the close was strong in the bid with per thousand.

n standing curb of \$8. Centennial Burch is stationary. Chloride Point continues to hold public favor, and though many shares changed hands in the week prices were not affected.

Sun Dance is quoted at 25 cents, and of 1,500 tons weekly. The weeks cut wedge was active at \$3.25 per thousand put ending Jan. 15th, being about 1,550 and offered at \$3.50.

Of the unbated active stock, Little tributed a big maximum Butte leads with 104 bid and 25 asked. The Okaungan and Kootenay Develop

prices were not affected.

Gevser Marion was the sensation of the week, Selling down to 78c, on Tues day and Wednesday, the shares rallied to 86c, on Friday and on Saturday sold up to 97c. The company's stockholders will hold their annual meeting January 31st. Mammoth has s healthy tone Stockholders'annual meeting will be held in Salt Lake February 1st. Mercur declared its second increased dividend of 18c, per share, payable January 20th. The stock did some business during the week, but scored no advance.

A demand for Outario sprang up near

A demand for Ontario sprang up near the close, and the shares went at \$3.55, with a further inquiry in sight. Sacra-mento has been stronger since the annual meeting. Swansen paid its usual divi-dead January 10th, as did also Silver

Los Angries, Cal., Feb. 1, 1898. Stocks were quite active on the floor of the mining exchange, and the dealings word distributed over quite a range of leading securities.

Brown Dake is quoted at 7c. per share, but not much business has been done. East Amargosa shows some improvement. Today's quotations for this stock were 50c. bid, \$1.00 asked, and thirty thousand shares were disposed of at 50c. per thousand.

Gold Bug is not holding strong, only \$2.00 per thousand having been bid, and \$7.50 was the ask quotation.
Lucky Star was not bid for at all on today's call.

Of the univided active stock, Little Butte leads with 1014 bid and 25 asked Amargosa follows at 5 bid and 10 asked Val Verde is down to \$1.00 bid and \$2 00 asked

NEW YORK CITY, Jan. 25, '98

The mining stock market has been dulk, with prices generally tending downward Of the Comstocks, Consolidated Cabiorin & Virginia, ruled steady at \$1.20, and Hale & Norcross at \$1.25.

The Colorado stocks have attracted most attention, and Lacrosse has been inquired for more freely at 14c, on the Consolidated Exchange. Mount Rosa held its annual meeting on January 11th, the result being a complete victory for Gold Coin Company, which recently purchased 360,000 shares of Mount Rosa stock.

Elkton Consolidated, which sold at 83c, two weeks ago, has risen to 88c. Isabella sold at 32@35c, last week, against 30@33c, this. This company reports a net profit of \$7.377 for December, 1897, its tonange aggregating 1,644 dry tons. On December 31st the balance in the treasury was \$103,000.

in the treasury was \$103,000.

The Pillgrim Gold Mining Company stock was listed on the mining exchange last week, and, although \$1.00 is the pervalue, \$460.\$4 50 per 1,000 shares was bid for it. The capitalization of the company is placed at \$1,500,000. The property is in the Cripple Creek and Copper Mountain districts of Colorado. The officers of the company are: B. F. Davis, president; C. H. Peters, secretary, and F. A. Bailey, treasurer and manager.

The South Dakota stock Howestake.

A. Bailey, treasurer and manager
The South Dakota stock, Homestake, has been in good demand, but there are no offerings. The company has declared its third double dividend, amounting to 50c. a share, payable January 25th These dividends are paid from the increased earnings of the company, which have been due to the enlargement of the mill to 400 stamps. The total output in December, 1897, was 222,230

ROSSLAND, B. C., Jan. 28th, '98 Rossland's mining output continues to be fairly stendy and in the neighborhood

This Company intends to explore or secure otherwise mining properties in the Okunngan and Kootenny district of British Columbia

ish Columbia

Of the Trail Creek sureties the B C Gold Fields is selling at 11c., Beaver, Big Three, and Bruce are averaging 10cents, Colonna brings 21 cts., and Commander 15 cents. Then comes Crown Point and Dear Park for 12 cents, Delaware and Engtern Star are going at 20c., Evening Star and Iron Horse are quoted at 15c Iron Mask has taken a jump and is now valued at 32c per share. Josie is selling at 32c, while jumbo is receiving 65 cts Le Roi is at the top of the heap with \$7.75 per share quoted

\$7.75 per share quoted
Lily May receives 18c. and Monta 19c
Monte Cristo 21., Rossland Red Mountain 18c., Southern C. & W. C. 20 ets.,
Virginin 15c. and West Le Roi is going
at 17 ets., War Engle Con. is quoted at
\$1.10 per share. This mine is still shipping ore in very small quantities only,
though it is stated that a very large
body of ore less on the dump at thermore,
pending the obtaining of cheaper transport and treatment facilities. Then
the directors hope speedily to annihilate
the present adverse balance of about the present adverse balance of about \$50,000

umbia Mining Critic published at Van conver has attracted a great deal of at tention. I send you believe the sub-stance of the article

stance of the article

The British Columbia Gold Trust
Limited, has purchased four lots on the
northwest corner of Granville and Duna
muir streets, Vancouver, for \$25,000,
with a view to creet offices thereon at a
cost of \$20,000. The block chosen
site is in one of the best business it
ions in the city, fronting the postoffice.
The purchase affords ret another proof
of the faith of leading financial organizations in the stability of British Colum
bia mining, and of their assurance that
Vancouver will become a great mining
center.



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CALIFORNIA

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#### MINING STOCK QUOTATIONS

NOTE
Humboldt
YORK

Alamo	031	Homestake 28	59
Alice	40	Iron Silver	-
Angella	46	Mexicon	30
Best & Beicher .	60	Mollie Gibson	19
Brunswick	06	Ontario 4	50
Bulwer	=	Ophir	_
Crown Point	66	Pharmaclat	10
Con. Cal & Va	100	Plymouth	
Cripple Creek Con	DRU	Quicksilver 3	De
Deadwood		Quickallver pfd 11	00
Pavorite11		Sierra Nevada	-
Fortuna	Öš	Standard 1	80
Gulden Fleece	45		75
Gould & Curry	46	Yellow Jacket	-
Hale & Norcross.	70	a deserted 3 stewards 1 .	
FINIC OC INDICIONAL			

Gould & Curry Hale & Norcross.	46 Yellow Jacket
COLORADO	SPRINGS STOCKS
Alamo	03% Inabella
Anaconda	48 Iowa
Argentum Juanita	20 Jack Pot
Bankers	02% Moille Gibson
Ben Hur	028 Moille Gibson .
CKAN	0081 Mount Rosa
C C & Manitou	02 Pharmaciat .
Creede & C C _	- Portland
C C Consolidated	08 Peoples
Garfield Groune .	04 Sacramento .
Golden Fleece	30 Star of the West
Gold & Globe .	- Union Gold
Cald Standard	OZS A common SS

300 Work

#### LOS ANGELES, CAL.

Rrown Dake	Mohawk Action Old Dominion Pacific Con Hand Mt	03% 01% 01% 01% 02%

#### SAN FRANCISCO

Alpha	19 24 23 85 10 86 86 10	Ruchequer Gould & Curry. Hale & Norcross. 1 Justice Mexican Ophit Overman Potosi Savage Sierra Nevada Union Con Utah	24 55 55 30 48 28 70 07
Con New York Crown Point	17	Yellow Jacket	0 <u>1</u>

SALT	LAKE CITY	
Alics	02 Maxhold 85 Mercur 8 00 Morgan 38 Northern Light 740maha 45	0136 40 
Daily Wort 3 Dailton & Lark Dailton & Lark 1 gir 1 gir 1 gir 1 gir  Guit  Guit  Guit  Guit  Galona  Geyner Marion  Gerand Central  Homestake  Homestake  Horn Silver  1	25 Overland	01) 16 85 00 02 20 80 27%

ROSSLAND,	BRITISH COLUMBIA.	
Alberta	65 Josle Mac	12
J. C. Gold King.	07 Josle	38
leaver	15 Jumbo	75
llg Three	16 Knight Templar	06
Huebied	07 Kootenay- London	10
Prico	10 Le Rol 1.8	00
tutte	0156 Lilly May	18
	0514Matiel	15
alifornia	15 Mayflower,	10
amp Bled	05 Montta	
Celtic Quaen	05 Monte Christo .	18

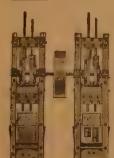
Camp Bird	Us Monita
Celtic Quaen	65 Monte Christo . 1
Centre Star	- Morning Star (
Colonna	24 Mugwump (
Commander	18 Nest Rgg [
Door Park	121, Northern Helle
Dr. Is Colla	02 Novelty (
Del sare	12 O. K 1
Lustern Star	20 Palo Vito
Laterprine	20 Phonix
Laterprine Eco	## ## 18 18 18 18 18 18 18 18 18 18 18 18 18
Kureka Con	05% R. R Lee
Evening Star	Officked Ragio (
Georgia	101, Red Mount, View
Gortruda ,	10 4 Red Point 1
Golden Drlp	15 Rossi'd H'mest'ke (
Good Hope	0314 Rossland, Red Mt. 2
Grand Price	03165t, Elmo, (
Grent Western,	08 St. Paul 1
Hattle Brown	- Silver Boll
Helen	04 Silverine (
High Ore	04%So Cross & W. Con 2

		. 19	Willie Domittag 1.
	DENV	ER ST	OCK REPORT
letna		00314	
Mamo		02%	Bureka
Anacondi		42	Garfield Grouse
readin		004	Golden Fleece.
1 Circini		0134	Goldsmith
Argent at		-174	Gold Standard
ta		27	Inviey
langkok			I ron Clad
Jankers		04	leabella
		ARIL C	E of Ex-

02	I ron Clad
04	Isabella
	Jack Pot
0452	Jeffernon
0197	Mollie Gibson.
002	New Zealand
808	People's
0154	Pharmacist
0812	
- "-	
	0232 0453 0194 002

Am Den & M Co 1 00 Helena & Frisco 8 00 Bald Butte,..... 2 80 Iron Mount an

Hidalgo Durango. Guanajuato Pughla Hidalyo



Innley Ironclud.

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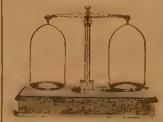
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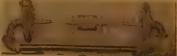
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"Light Weight" Horse Forks,

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"Eclipse" Stackers, and

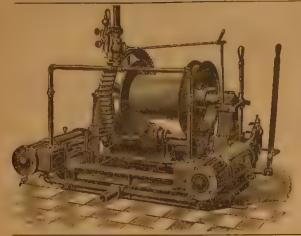
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Compound Pump 200 foot lift for Hydraulte Mining

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Adams	.031 G060 G000 G000 G000 G000 G510 S. L. C000 G. S600 G. S.	) <u>.</u>
Alaska   Creadwell   Alaska   Cou	.000 G031 G001 G000 C000 G000 G000 C500 G510 S. L. C000 G. S000 G. S.	
Alaska Mexican         Alaska Mexican         200,000         1,000,000         0         10         Oct. 1897         205           Alice         Montana         400,000         10,000,000         25         03         Oct. 1897         1055           Anaconds         Montana         1,200,000         30,000,000         25         1 25         May 1897         8,750           Anchoria Leland         Colorado         600,000         600,000         1 01         Oct. 1897         23           Atlantic         Michigan         40,000         1,000,000         25         1 00         Feb. 1897         243           Atlantic         Michigan         40,000         1,000,000         25         1 00         Feb. 1897         746           Bald Butte         Colorado         600,000         600,000         1         03         Sept 1897         512           Bay Six         Colorado         500,000         600,000         1         01         July 1896         107           Botton & Montana         Montana         150,000         8,750,000         25         3 00         Aug 1897         6,27           Boulon & Montana         100,000         1,000,000         1         00	000	
Anaconds	.000 C, .000 G, B, L, .000 G, B, L, .500 G, S, .510 B, L, C, .000 G, S, .000 G, C, S	
American Gold         Colorado         800 000         8,000,000         10         02         Aug 1897         273           Adlaute         Michigan         40,000         1,000,000         25         1 00         Feb. 1897         746           Rald Butte         Montana         250,000         250,000         1         03         Sept 1897         512           Bangkok C-Bell         Colorado         600,000         600,000         1         01         July 1896         107           Big Six         Colorado         500,000         8,750,000         25         8 00         Aug 1897         5           Bulion Beck and Champion         Utah         100,000         1,000,000         10         50         Mar 1897         2,465           Bunker Hill and S         Idaho         300,000         8,000,000         10         50         Mar 1897         323           Cariboo         British Col         800,000         800,000         1         02         May 1897         156           C. O. D         Colorado         500,000         600,000         1         01         March 1896         25	,000 G. S. I. ,000 C. ,500 G. S. ,510 S. L. C. ,000 G. S. ,000 G. C. S.	
Adlantic   Michigan   40,000   1,000,000   25   1 00   Feb. 1897   740	,500 G, 8, ,510 8. L. C. ,000 G, S. ,000 G, C, 8	,
Big Six	,510 8. L. C. ,000 G. S. ,000 G. C. S	
Boston & Montana   Montana   150,000   3,750,000   25   8 00   Aug 1897   6.275	,000 G, C, S	
Bullion Beck and Champion         Utah         100,000         1,000,000         10         50         Mar 1897         2,466           Bunker Hill and S         Idaho         300,000         8,000,000         10         05         Oct 1807         32           Cariboo         British Col         800,000         800,000         1         02         May 1897         156           C. O. D         Colorado         500,000         600,000         1         01         March 1896         25		3.
C. O. D	.000 G, S. .000 S. L.	
70 OF	,965 G.	
Calumet & Hecla	.000 G,	
Centennial Eureka	.000 S. L.	
Charleston	.000	
Champion Cutifornia 34,000 340,000 10 25 Aug 1897	200 G.S.	
Copper Queen Consolidated		
Daiv Utah 150,000 3,000,000 20 25 Mar 1897 2,923	,000 B, L,	
Deadwood Terra         Dakota         200,000         5,000,000         25         40         June 1897.         1,320           De Lamar         Idaho         400,000         2,000,000         5         25         Jan 1897.         2,250		
Della S	,000 G.	
Dalton and Lark	,500 S, L.	
Elkton Consolidated	,960 G, S. ,393 G, S.	
Florence Montans 500,000 2,500,000 5 01 May 1897 133	,530 8.	
	.000 G,S,L	4
Geyser-Marion Utah 800,000 1,500,000 5 08 Nov 1897 5	,000 G.	
Golden Fleece Coloredo 600,000 1 01 Feb. 1897 569	.179 G, S.	
Gold Coin	,000 G,S. ,625 G,	
Heela Consolidated. Montana 30,000 1,500,000 50 50 Feb 1897. 2.17	000 S, G, L	., C.
Highland S. Dakota 100 000 10,000,000 100 20 Oct 1897 3.42	,000 g, t., 1,918 G.	
Holy Terror	3,000 G. 3,250 G.	
Hope Montana 100,000 1.000,000 10 10 Nov 1897 73	.252 S.	
Idaho	000 8, L.	*****
Iowa Colorado 1,000,000 1,000,000 1 001/6 Uct 1807 6	5,000 G. 7,500 S.	
Isabella	0,000 G.	
Lest Chance Brit Col 500 000 500 000 1 04 Jan 1897	0,000 C. 2,000 S. L.	
Le Roi British Col 500,000 2,500,000 5 10 Oct 1897 62	5,000 G.	
	) 000   J. ),000	
Moose	i,000 G. 3,600 G.	
Mt. Rosa	),000   G.	
Mammoth Utah 400 000 10,000,000 25 05 Nov. 1896 1,15	5.000 G. S. O	0.
000,000   000,00	3 000 G. 3,000 G	
New York & Hon, Rosario. Central A. 150 000 1.500 000 10 10 0ct. 1897	2,500 S, G.	
New Idria Quickailver California 100 000 500 000 5 10 Sept 1897 2	0,000 Q. 0,000 Q.	
Ontario		
Parrot	3,122 O.	
Pennsylvania Consolidated	0,750 3,000 G, S.	
Princess	5,000 G. 0,000 C.	
Quincy Idaho 100,000 2,500,000 20 4 00 August Aby 8,40 Runbler - Cariboo Brit. Col 100,000 1,000,000 1 02 April 1897. 4	0,000	
Reco   Brit. Col	7,500 S. L. 2,000 G.	
Small Hopes Consolidated	5,000 8.	
Standard	7,868 G, S.	
St. Joseph Missouri 250 000 2 500 000 10 16 Oct 1897 2	1,000 L. 7,500 S, L, t	tt.
Storan Star Brit. Col 2 000 000   1 000 000   0.50   05   Mar 1897	000,0	
Swannea	0,000 G. S. 1,500 S. L.	
100 Boy . Colorado 200 000 2,000,000 19 20 March 1880 . 41 Famaruck . Michigan 20 000 1 500 000 15 2 0 June 1897 4.93	0,000 G.	
	8 000 8	
Omito verde. Arizona 300,000 3,000,000 10 25 December 1893 50 Utah 100,000 20 02 Feb. 1893 17	2,500 C. 5,000 G. S.	
Out Consolidated Utub 30,000 160,000 5 03 Sept. 1895.	3,000 S. L. 5,000 G.	
Montana 500 000 500 000 1 10 Mar 1897	2,000	
War Eagle	7 000	-:



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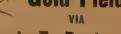
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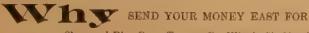
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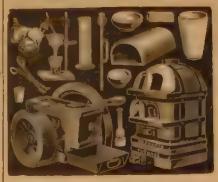
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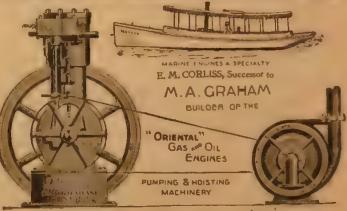


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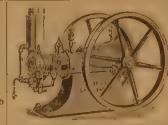
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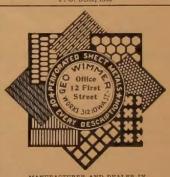


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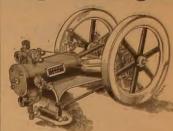
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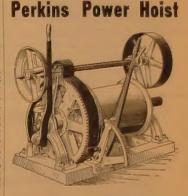
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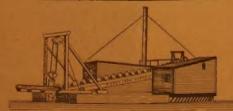
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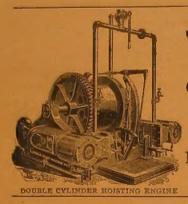
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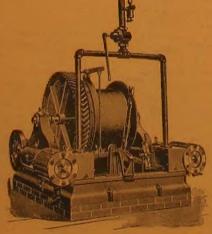
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